WORD 5.1 REVIEW

UNIXWORLD

McGraw-Hill's Magazine of **OPEN SYSTEMS COMPUTING**

SEPTEMBER 1991

Product Review

MANAGING YOUR DESKTOP

3 products for Motif simplify commercial UNIX

Will Success Spoil The Internet?

Unjamming Client-Server Bottlenecks

More Reviews

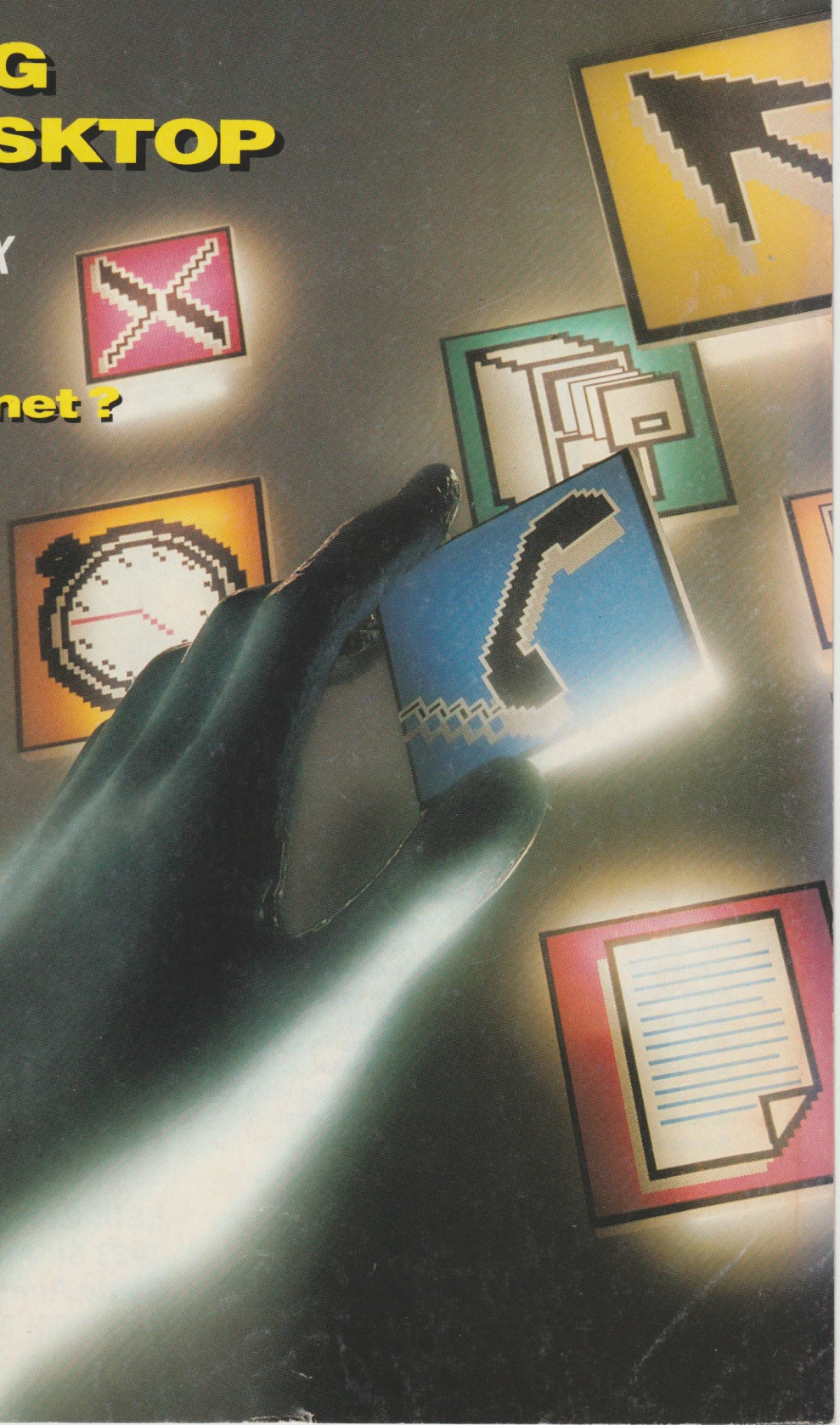
- *BriteLite laptop runs Sun, DOS, & Mac*
- *X-Based Microsoft Word*

Tips

DOS Fireworks *saves UNIX screens*

Tape Backup

How users choose



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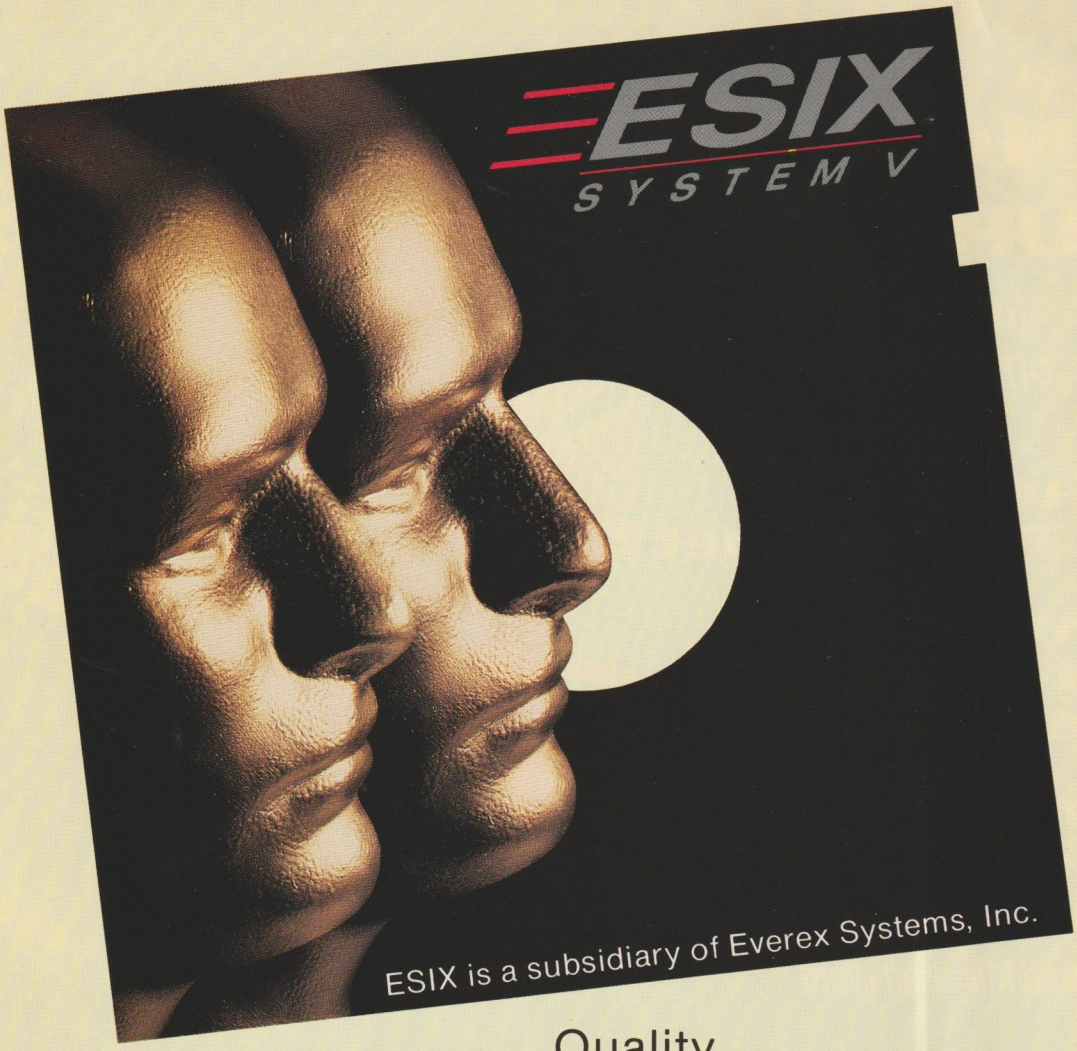

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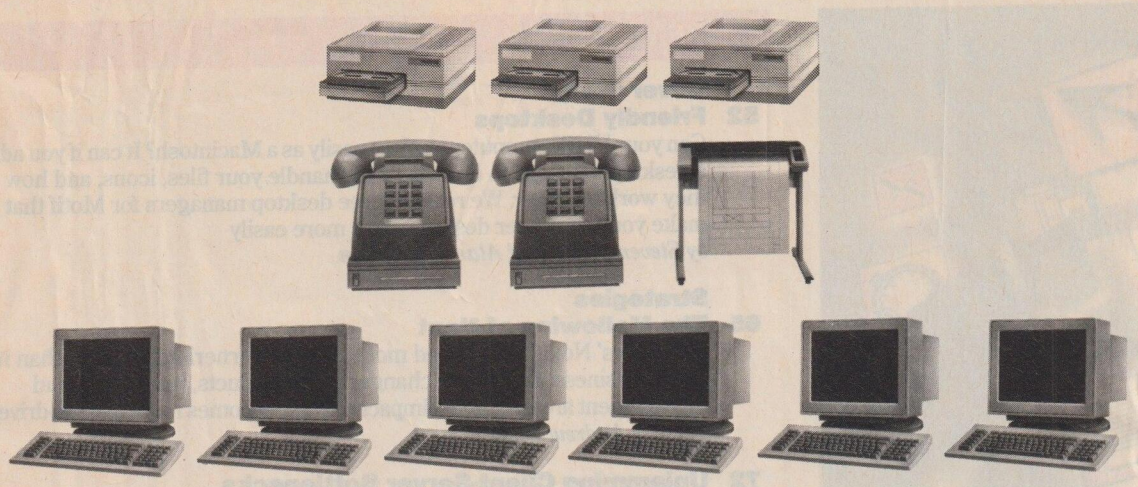

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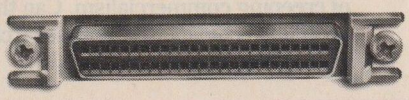

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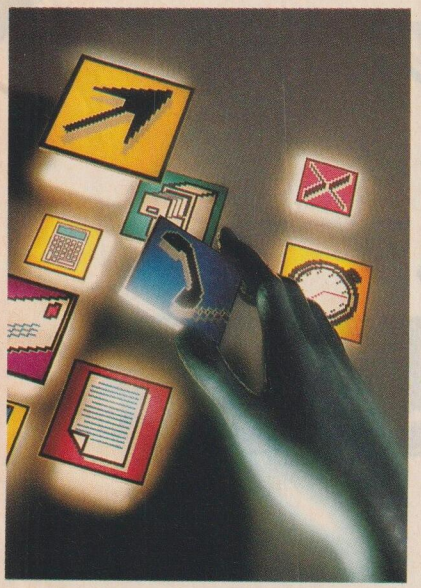

Programmers pooh-pooh the significance of desktop managers but they're here, and we think they can help. Our review of three of the best desktop managers for Motif begins on page 52.

Cover photograph by Gerry Zager.

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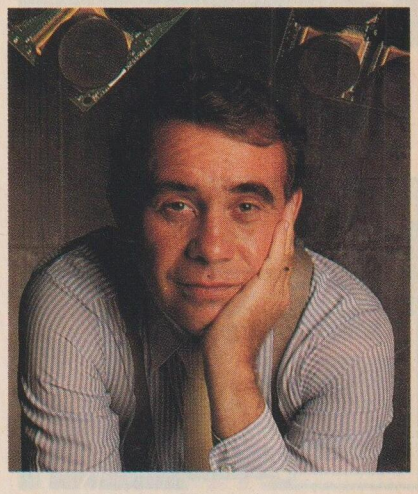

Top: *Ross Technologies' CEO Roger Ross has the drive to succeed and to show up his former employer–Motorola. See page 45.*
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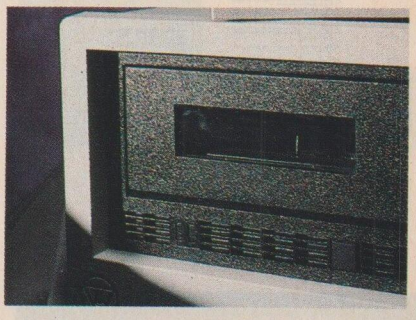

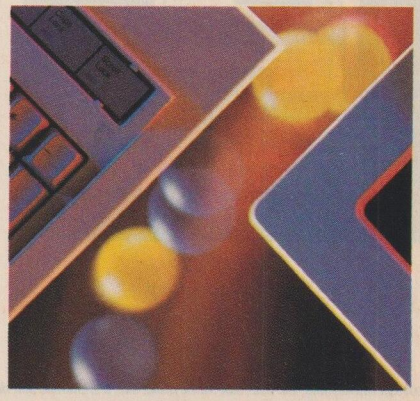

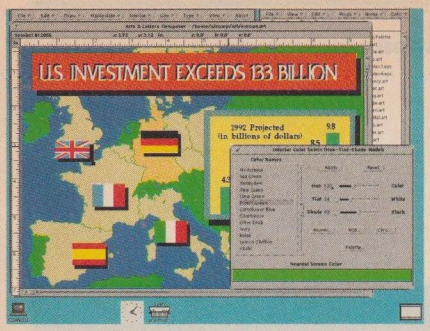

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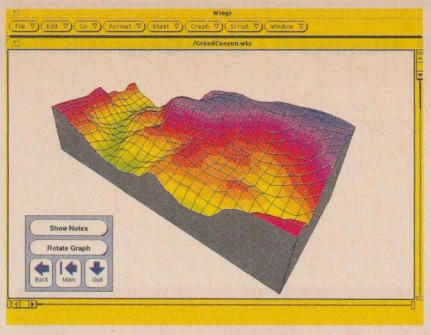

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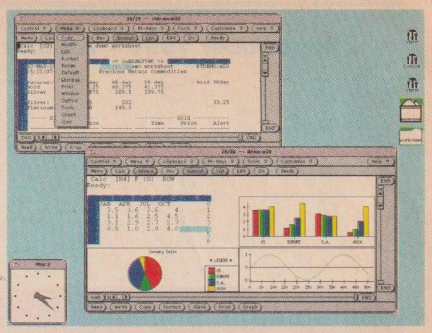

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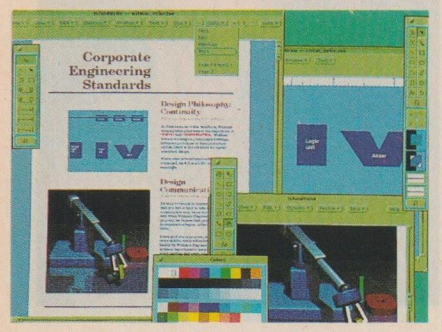

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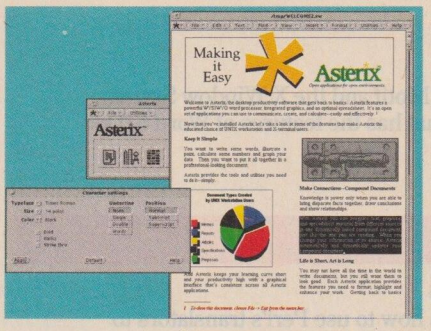

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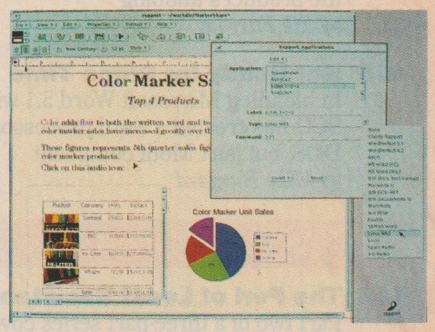

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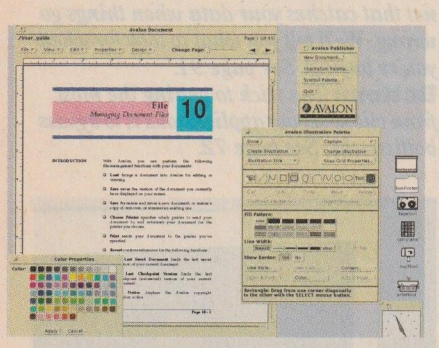

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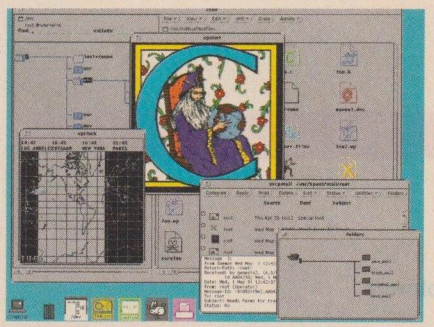

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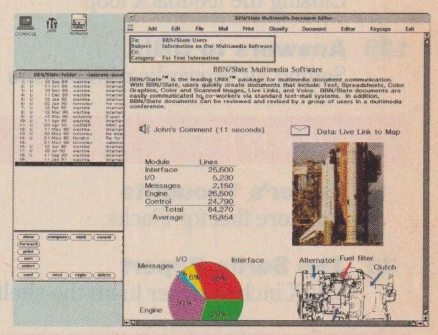

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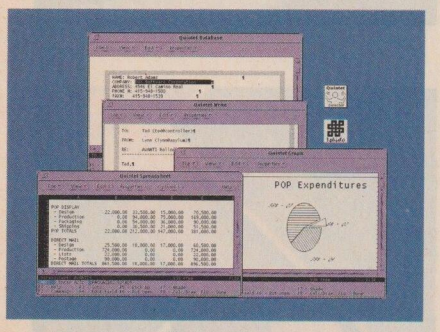

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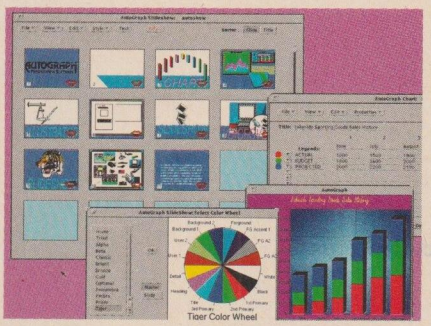

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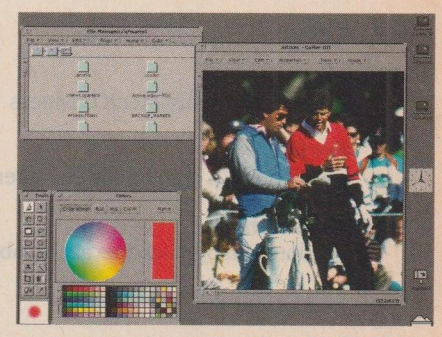

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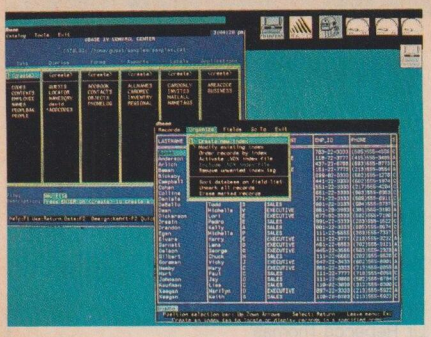

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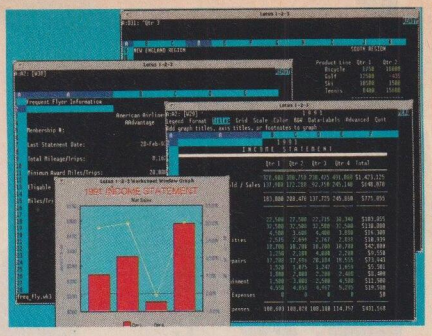

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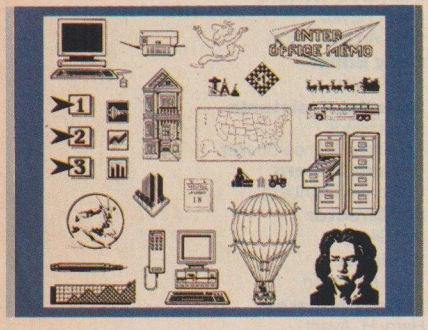

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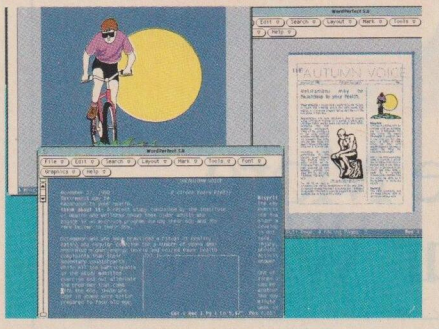

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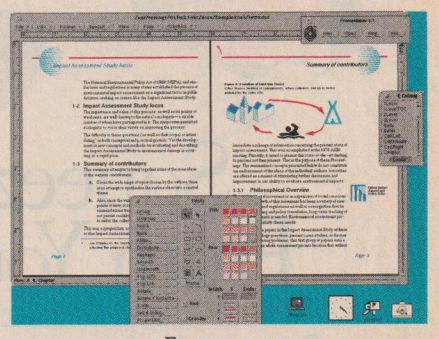

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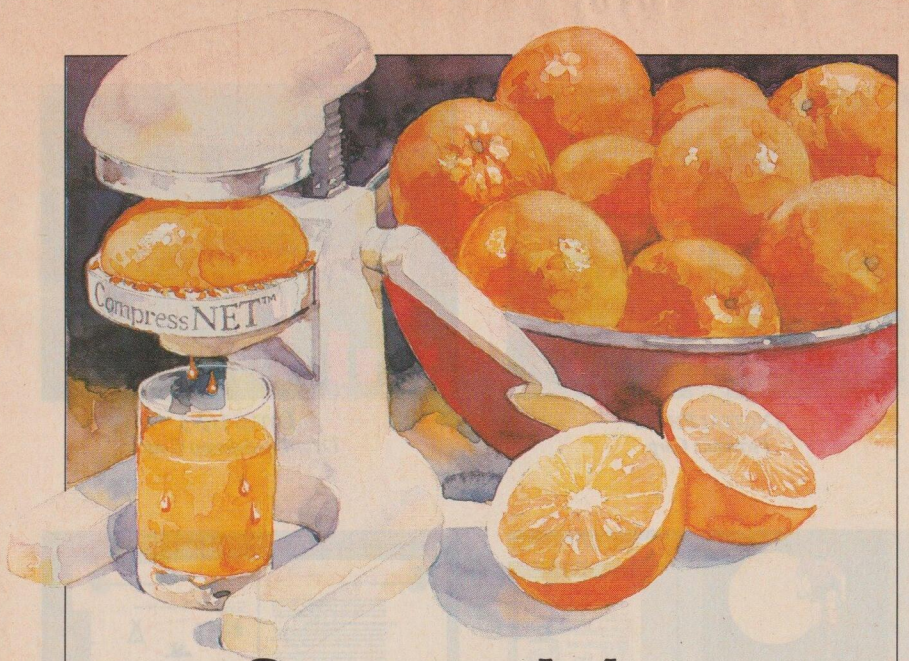

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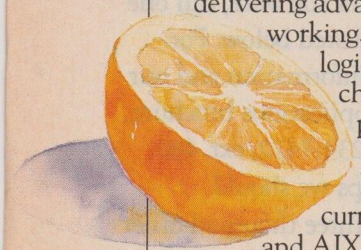

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CIRCLE NO. 188 ON INQUIRY CARD

NO MORE FLAK FOR FLACKS

As I write this, I am preparing to leave for a Flack family reunion. My mother is a genealogist, so when I visit I find out about my ancestors and all the new relatives she's discovered. I thought about dialing up the McGraw-Hill mainframe to see if any of you subscribers are named Flack–more grist for mother's mill. Actually, I may have gone too far already. If I get letters and e-mail from those of you named Flack I will tell you now: "No, you can't get a free subscription, and yes, you *will receive* a letter from my mother!"

I'd like to set the record straight about the words flak and flack. The reason this column is called "Editor's Thoughts" instead of something really clever like "More Flack from Dave" is simple. We Flacks have a tough enough time with the word flack–which is a slang term for a press agent–without getting it mixed up with flak.

Flak is a four-letter German acronym for anti-aircraft fire: *FLieger-Abwher-Kanone* to be specific. For years *Webster's Dictionary* maintained a distinction between the words flak and flack. Now Webster says that flack is flak and flak is flack. What really bothers my mother is that, according to her research, we are indirect descendants of Noah Webster.

In public relations–a field in which, believe it or not, I once worked–a flack is someone who fills editors' fax machines with junk and sends editors mail with confetti that falls out when it's opened. For me, working in PR was as funny as being a dentist named Paine or a locksmith named Jimmy.

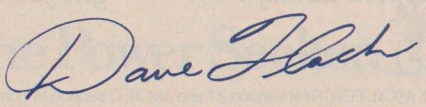
By now I'm sure you are wondering what all this has to do with *UNIXWORLD* or the computer industry. Bear with me as I use the following example to illustrate the correct use of flak, flack, and Flack.

We are prepared to take some flak from RDI, the company that makes the BriteLite SPARC laptop we have reviewed in this issue. During the review process, we interviewed RDI's president, Rick Schrameck. At different times, Mr. Schrameck claimed 1991 projected sales of RDI's laptop computer at $213 million and $113 million. He also claimed an order backlog of $80 million, but later reduced it to $40 million. When we checked with RDI customers about the size of their orders for the BriteLite, we found large discrepancies.

As we were about to go to press, we asked for one final interview with Mr. Schrameck to be sure we had not misunderstood him and that he was willing to stand by his claims. We were told by his public relations person, Steve McAllister, that Mr. McAllister would be the primary contact and Mr. Schrameck would no longer be giving interviews to the press.

According to Mr. McAllister, RDI still anticipates significant sales, but he declined to commit to a figure. As for past wavering on projected sales, he said, "the dynamics of strategic relationships had changed." When pressed, he said the company's current backlog is $2 million and sales to date were about $8 million.

Mr. McAllister definitely understands the finer points of public relations–particularly damage control and the need to be straightforward with the press. So long as he doesn't send me letters with confetti or fill our fax with non-facts, I won't label him a flack. But I should check with my mother. If she finds McAllisters in our family, he might have to put up with being a relative Flack. ■



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	Hardware Price	MFLOPS	SPECmarks™
POWERserver 550	$62,000	25.2	72.2
SPARCserver™ 470	$77,800	3.8	19.4
DECsystem™ 5500	$74,700	4	21.5

MFLOPS are LINPACK double-precision where n=100. AIX XL FORTRAN Version 2.1 and AIX XL C Version 1.1 compilers were used for these tests. SPECmark is a geometric mean of the ten SPECmark tests. All prices current at publication.

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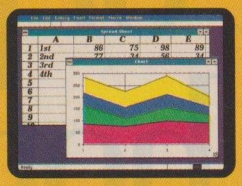
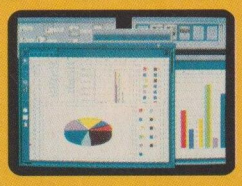


PC Graphics?
YES!

X Windows?
NO!

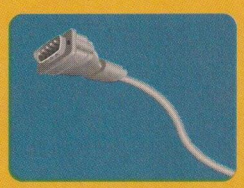


X Windows?
YES!

View FAX?
NO!

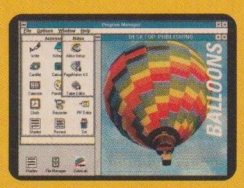
View FAX?
YES!

32 Mbps Twisted Pair?
NO!



32 Mbps Twisted Pair?
YES!

Color Under $1000?
NO!



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CIRCLE NO. 223 ON INQUIRY CARD

BIG BLUE GOES FOR APPLE'S CORE

What do you get when you cross an Apple Macintosh with an IBM RS/6000? Apple and IBM may soon find out. The two companies have signed a letter of intent to cooperate in developing a new Posix-compliant operating system and a new version of IBM's Power RISC (reduced instruction-set computing) CPU. These new products will run on Macs, IBM PCs and workstations, and other vendors' products as well.

The two companies signed the letter of intent in July, although the agreement won't become final until a series of contracts are signed. According to the agreement, IBM and Apple will form a jointly owned, independently managed subsidiary that will merge elements of each company's existing technology into a new object-oriented operating system. The new operating system will run applications written for IBM's version of UNIX, called AIX, as well as OS/2 and Macintosh software. It will run on IBM-compatible PCs, RS/6000 workstations, and Macs.

The jointly owned company will also offer versions of the new operating system for other vendors' computers and workstations. Neither company would confirm whether the merged operating system, which will probably include elements of both AIX and Apple's version of UNIX, A/UX 2.0, will be compatible with UNIX System Laboratories' UNIX System V Release 4 or the Open Software Foundation's OSF/1.

The name and structure of the new company had not been set at press time, but IBM confirmed that David Liddle was under consideration to head up the company. Liddle is president of Metaphor Computer Systems, which last year formed a joint venture with IBM called Patriot Partners to develop object-oriented software tools. IBM has also agreed to buy Metaphor, which will be a wholly owned subsidiary of IBM.

IBM and Apple say they will also develop and market an enhanced version of AIX with Mac and Motif user interfaces.

Apple also announced it will use a forthcoming single-chip version of IBM's Power RISC CPU in future versions of the Macintosh. The single-chip CPU, dubbed "Power PC," will be manufactured by Motorola and is based on a single-chip Power design that has already been developed by IBM. The current IBM Power chip set contains five chips. The decision quells rumors that Apple might use the MIPS Computer Systems Inc. R4000 or Motorola 88100 RISC CPUs in future Macs.

Although Apple decided against the Motorola 88000 line, the move has revived Motorola's hope of becoming an important player in workstation CPUs. Although the world's biggest semiconductor maker was once the dominant force in workstation CPUs with its 68000 series, Motorola's computer chip customers have waned since Sun Microsystems shifted to the SPARC architecture and other workstation vendors to non-Motorola RISC chips. According to the agreement, Motorola's high-volume version of the Power PC chip will be sold to Apple and IBM, as well as any other vendors that want it. The Power architecture has the potential to become a competitor to SPARC and the MIPS R3000/4000.

Apple and IBM have also agreed to work together in several other areas, including networking and multimedia. The products of those joint development efforts will be licensed to other vendors. IBM will also work to integrate Macintoshes into large IBM enterprise systems, which could result in IBM selling Macs into formerly IBM-only installations.

The two companies say that products from the new joint efforts are expected to appear over the next two to three years.

continued

SEQUENT TO MOVE AWAY FROM ITS OEM BUSINESS

Sequent Computer Systems Inc. says it will "exit the OEM business" and restructure its business to address this change. The company expects to report a second-quarter loss that will "significantly exceed" its $7 million, or 30 cents a share, loss in the first quarter. It has laid off the head of its original equipment manufacturer (OEM) group, says Sequent's President Scott Gibson.

The exit announcement set off bells and whistles at Unisys Corp., Sequent's largest customer and an OEM of its systems. Unisys' financial problems have severely "hampered the company's ability to resell Sequent systems," according to a Sequent spokesperson. Unisys officials assert its OEM relationship, established in 1989, with Sequent will continue unchanged. Sequent's resell orders grew in 1989 to $50 million, or 34% of its business, but were projected to decline this year to $34 million, or 13%, of its business.

"Our language [in the announcement] was too terse," admits Bill Trainer, Sequent's corporate communications manager. But he confirms Sequent's plans to "ramp down the OEM side" of its business.

Sequent's OEM business has been "a burden," says Catlin Wolfard, an analyst with Black & Co. Inc. Sequent also announced that it would dismiss 7 to 9% of its world-wide workforce of about 1,700 people, freeze salaries, reduce travel, and severely restrict capital purchases.

SUN INTRODUCES MID-RANGE AND LOW-END SYSTEMS

Although Sun has delayed the introduction of its multiprocessing Galaxy line because the software isn't ready, it was expected to announce its mid-range IPC 2 and low-end SLC 2 workstations in late summer.

"The Galaxy slippage isn't meaningful to Sun's revenues," says Cliff Friedman, an analyst with investment firm Bear Stearns. Friedman says he is bullish on Sun because of the introduction of the long-awaited additions to the IPC and SLC lines.

The IPC and SLC introductions are "very positive for Sun," says Jeff Canin, an analyst with Montgomery Securities. If Sun didn't make the introductions it would have been "disastrous" because of increased competition from Hewlett-Packard and IBM, Canin says.

Analysts predict weak summer revenues for Sun as it goes through product transitions, however.

LOTUS AND SCO SETTLE LAWSUIT

Lotus Development Corp. and The Santa Cruz Operation have reached an out-of-court settlement regarding the Lotus 1-2-3 spreadsheet. Lotus had accused SCO of illegally copying 1-2-3's look-and-feel and, as part of the settlement, SCO will pull its SCO Professional spreadsheet from the market. SCO also agreed to recommend that its customers switch to 1-2-3 and will help Lotus market 1-2-3 to Professional users. SCO did not admit to infringing Lotus' copyrights, but avoided a trial that some analysts predicted SCO would have lost.

Lotus has sued Borland International in a similarly alleged infringement. Borland representatives have said there will not be an out-of-court settlement.

ACE MEMBERSHIP JUMPS, BUT MARKET IMPACT LAGS

Forty more companies have committed to the Advanced Computing Environment (ACE) initiative, a group of vendors supporting RISC chips from MIPS. Although the ACE initiative continues to gain a healthy backing from system, software, and semiconductor vendors; HP, Sun, and IBM hold 70% of the RISC workstation market. ACE supporters–including Compaq Computer, Digital Equipment Corp., Microsoft, and SCO–won't have a shipping Advanced RISC Computing (ARC) product until 1992, which will hurt its chances of gaining a substantial foothold in the RISC workstation market, say analysts.

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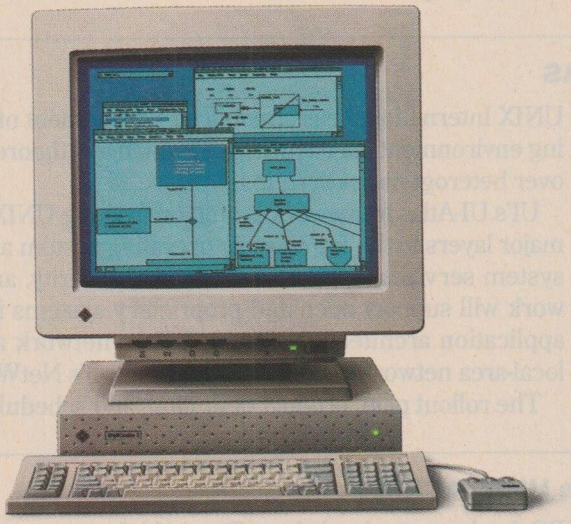

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CIRCLE NO. 52 ON INQUIRY CARD

"The fallacy of ACE is that there are no volume producers," says Friedman of Bear Stearns.

ACE now has about 60 members (SPARC International has 191), that represented more than $3 billion in revenues in 1990. Many of the companies are PC vendors, including Epson America.

UI ANNOUNCES ATLAS

UNIX International has announced a "statement of direction" for its distributed computing environment, an environment which will theoretically allow users to run applications over heterogeneous systems.

UI's UI-Atlas framework is built on existing UNIX System V network facilities, with six major layers in the framework: operating system and network communication services, system services, application services, security, and interoperability. The Atlas framework will support open and proprietary systems including OSF's DCE, IBM's system application architecture (SAA), DEC's network applications support (NAS), and PC local-area networks (LANs) such as Novell's NetWare.

The rollout plan, product definition, and schedules will be announced this month.

ASHTON-TATE dBASEs UNIX AGAIN

PC database vendor Ashton-Tate, which was recently bought by Borland, has released a second UNIX version of its popular dBase IV database manager. dBase IV for 386 UNIX runs under XENIX and versions of UNIX for the 386 CPU from SCO, Interactive, ESIX, and AT&T. It follows a SunOS version released in January. The 386 version is a character-based implementation with the same "look and feel" as the DOS version, though the company says it will eventually provide mouse support and a full graphical user interface (GUI) under Open Look and Motif. The new product supports multiple users and record locking. Ashton-Tate claims DOS users can port their dBase applications to UNIX with little or no change required, making an easy migration for those running into the limitations of DOS.

The company says dBase IV for 386 UNIX isn't intended to replace full-scale relational database managers from Oracle, Informix, or Sybase. Under DOS, dBase calls itself a relational database, but Ashton-Tate Group Manager Ken Rhie says UNIX users take the "relational" label more seriously, so the UNIX version is being positioned as a "personal productivity tool." A single-user license is $995; a license for unlimited users on a single computer is $1,895. Single-user DOS license is $795.

SUNSOFT ANNOUNCES INTER-APPLICATION COMMUNICATIONS

SunSoft, Sun's software subsidiary, announced a messaging service for UNIX applications. The new interapplication communication system, called ToolTalk 1.0, is scheduled for release by the end of this year. SunSoft says ToolTalk is the first piece in a comprehensive software environment for SPARC-based workstations that will be unveiled in the last six months of 1991.

ToolTalk consists of an object-oriented message service that works between independent applications or among a set of applications designed to cooperate with each other. The messaging system can work within a single machine or across networks. ToolTalk is also designed to be compatible with the Distributed Object Management Facility that Sun and HP recently submitted to the Object Management Group for consideration as an industry standard for managing object-oriented messages.

Several applications and programming tool vendors say they'll support ToolTalk, including Lotus Development, Cadence, Valid, Cadre Technologies, Interactive Development Environments, Saber Software, and Clarity Software.

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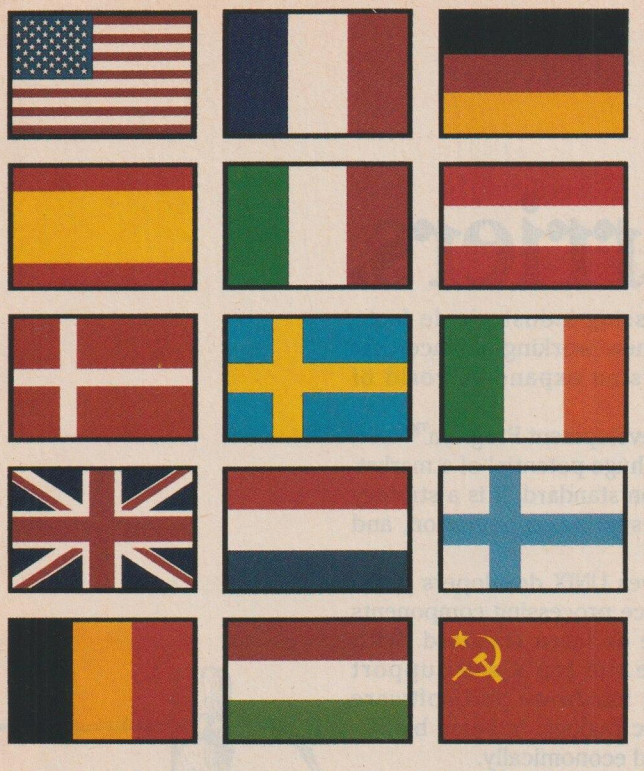

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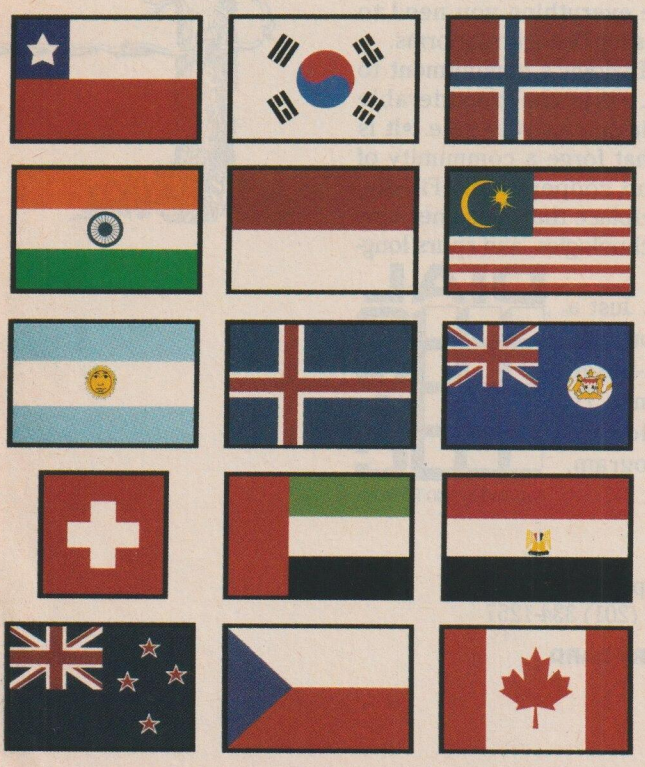

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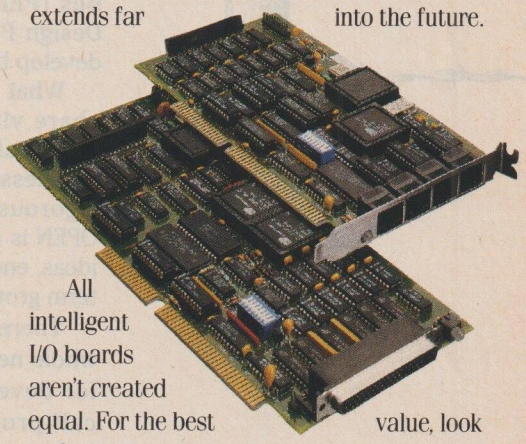

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HP, UNIPLEX DO MAIL BONDING

HP and Uniplex say they will combine forces to port HP's OpenMail electronic mail system to non-HP platforms. Uniplex will embed OpenMail in its office-automation applications and port it to a wide range of UNIX platforms. For its part, HP will sell Uniplex's software through its own direct sales force.

The agreement gives Uniplex a consistent version of electronic mail that conforms to the CCITT's X.400 standard. OpenMail will now work on networks of HP, DEC, and IBM systems, and will communicate with proprietary and public e-mail systems including IBM Profs, DEC All-In-One, and MCI Mail. For HP, the new arrangement will make it easier to move OpenMail to platforms beyond HP-UX, SCO UNIX, and IBM PS/2 AIX, where it's already available. HP says that because Uniplex already has 50% of the UNIX office-automation market, it should increase OpenMail's market share. In addition, the deal gives HP a firm foundation for the groupware applications that HP believes will form the next generation of UNIX office software.

The first targets for the Uniplex/HP OpenMail will be the IBM RS/6000 and DEC 5100, priced at $325 per user. Other systems on the list include Sequent, NCR, Sun, Pyramid, MIPS, and Unisys.

SPREADSHEET DEVELOPER CLOSES SHOP

Olympus Software, a 10-year-old UNIX software developer, filed chapter seven bankruptcy this spring. The filing came after a proposed acquisition failed when a crucial executive departed. Dick Kreutzer, Olympus' vice president of engineering and the original developer of the UltraCalc II software, says he was willing to abandon his 35% stake in the company because the acquisition would not have adequately compensated him for his "sweat equity." Kreutzer's departure killed both the acquisition and Olympus, he says. There are about 10,000 copies of UltraCalc in the market, estimates Kreutzer.

What happens to users of Olympus' software? Kreutzer is willing to provide consulting services for customers that want to switch to another spreadsheet. UltraCalc II is not compatible with other spreadsheet formats. He's willing to help people who are stranded, he says, but "I can't fix bugs. I don't have access [to the code] since the product is in the possession of the court." (Kreutzer can be reached at 801-944-5567 or via e-mail at `uunet!hellgate.utah.edu!caeco!integra!rwk`.)

CLEARING THE AIR ON AT&T-FREE BSD

In the July issue of *UNIXWORLD* an article in "Industry News" titled "AT&T-Free BSD Set for Fall Release" discussed a company called Berkeley Software Design Inc., which says it will ship an operating system based on Berkeley UNIX without any AT&T code included.

We wrote the story based on information provided by Berkeley Software Design Inc., an offshoot of UUNET, under a non-disclosure agreement. At the time, the company said it expected to demonstrate its AT&T-free BSD at the summer Usenix conference in Nashville, Tenn., but it couldn't provide us with an office address or telephone number.

We named Donn Seeley and Bill Jolitz as BSDI's two full-time employees, but apparently their involvement in BSDI is still under discussion. We also received calls from sources at Berkeley who questioned the accuracy of our information.

So where does this leave readers interested in AT&T-free UNIX? We have learned from a source at UC Berkeley that the BSD flavor–4.4–won't be released until early next year. BSDI will not have the first implementation of the code, says the source. He predicts "a dozen" vendors will be interested in distributing the product.

continued

LEGION OF DOOM MEMBERS GO LEGIT

A group consisting of former members of "The Legion of Doom," which has been referred to as "the most notorious hacker group in America," has formed a computer security consulting company. Scott Chasin, an ex-LOD member and an associate in the company, called Comsec Data Security, says the group has a systems penetration success rate of 80 to 85%. Comsec will offer security penetration testing and auditing services, he says.

"We didn't want to be hacking when we were 30 years old," says Chasin. "You don't know when the Secret Service is going to be knocking on your door."

Some security experts say the group has attained its security expertise illegally. "We strongly disapprove of this company," says Alan Zeichick, an editorial director for the Computer Security Institute, an organization of computer security professionals. "They've gained knowledge immorally."

ONE MAN'S JUNK...

In an effort to supply Eastern European and Soviet educational and research organizations with much-needed computer systems, a not-for-profit organization is soliciting systems from U.S. businesses.

"What may have no cash value to an American company would be an extremely valuable information-processing tool in Budapest or Prague," says Alex Randall, the executive director of the East-West Education Development Foundation. He says East-West has already received numerous minicomputers, including a number of HP 3000s.

For further information, contact the East-West Development Foundation at One Exeter Plaza, 15th Floor, Boston, MA 02116 Telephone: 617-542-1234; Fax: 617-542-3333.

UNIX *SONGS?*

Yes, UNIX songs. Poems too. The UK UNIX Users Group wants to collect songs, ballads, poems, etc. about the early days of UNIX, says Mick Farmer, UKUUG secretary.

"We are interested in collecting these before they disappear in the mists of time," he says. "[Before they] get thrown out on the disk attached to that old PDP-11 or similar ancient kit." Please send any pieces to Mick Farmer, Secretary UKUUG, Department of Computer Science, Birkbeck College, Malet Street, London WC1E 7HX, England. Telephone: +44-71-631-6351; fax: +44-71-636-4971, or net: `mick@cs.bbk.ac.uk`.

OVERHEARD

As Cicero once said: *"Sit denique inscriptum in fronte unius cuiusque quid de rebus publicis sentiat."* Larry Plona of Rutgers University translates it as: "Let it finally be written on the forehead of each man what he thinks of open systems."

A joke making the rounds in the industry tells how God called George Bush, Mikhail Gorbachev, and Bill Gates together to inform them that the world would end in 30 days. So Bush gets on national TV in the United States and says, "Well, I have good news and bad news. The good news is: There is a God. The bad news is that the end of the world is gonna happen in 30 days."

Gorbachev gets on Soviet TV and says, "Comrades, I have bad news and worse news. The bad news is, there is a God after all. The worse news is, the world will end in 30 days."

Meanwhile, Bill Gates assembles all the Microsoft employees, pushes his glasses up on his nose, and says, "I have great news and insanely great news. The great news is that God thinks I'm as important as Bush and Gorbachev. The insanely great news is that a month from now, Apple and IBM will be out of business."

–Edited by Gary Andrew Poole with staff reports. Research by Catherine Steinberg. Please contact Poole at `uunet!uworld!garyp` *or* `garyp@uworld.com` *or 415-940-1500 with any breaking news or comments.*

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CIRCLE NO. 16 ON INQUIRY CARD

MORE STORIES LIKE THIS!

Dear Editor:

I was delighted to read your interview of Walter De Backer (June 1991). The interview is a great asset to the UNIX community due to the honesty shown by Mr. De Backer and the quality of the interviewers' questions–going straight to the point, revealing the real IBM feelings toward open systems.

This is the kind of article that keeps *UNIXWORLD* at the leading edge of the UNIX magazines!

Jose Angeles
Computer Consultant
Dominican Republic

Features Writer Gary Andrew Poole responds: Thank you for your comments. At press time, Walter De Backer was waiting to be reassigned at the European Commission. Ubaldo Zito has reportedly taken his place as director of the EC's central computer services.

"DOS-to-UNIX Connection" Connects

Dear Editor:

I am a new subscriber to *UNIXWORLD* and new to the world of UNIX, and at the moment I am finding it hard going. However, I also find it great fun trying to understand the UNIX environment. I find your publication a well-informed and well-presented magazine that gives an independent view of a very complex subject.

I have a local-area network (LAN) of 12 PCs using thin Ethernet supported by a 3Com dedicated file server and software. The connections are through 3C501 and 3C503 network cards. I also have a 386 PC with a 3C503 network card and The Santa Cruz Operation's Open Desktop running UNIX **scosysv**.

Both systems have compatible databases and I'd like to connect them. I've been informed that this is impossible because the 3Com protocol is XNS and the SCO protocol is TCP/IP, NFS, and Desktop Manager. I have read articles that imply that such a connection may be possible. Although "The DOS-to-UNIX Connection" (June 1991) article does not mention XNS, I'm wondering if you are aware of something that would do the job. Cost is also a major factor.

Robert Farmer
Gwent England

Products Editor Howard Baldwin responds: 3Com TCP with DPA (demand protocol architectures) is software designed specifically to get XNS and TCP/IP to communicate. It is the second generation of a product called PCS/TCP, which 3Com and Bridge co-developed prior to their 1987 merger. It sells for $350 for a single user.

You might also contact two companies that sell networking products in the U.K.: Frontline (256-844-923) and GEC (81-906-6238). Good luck.

Making the Connection

Dear Editor:

I am new to the UNIX world, having cut my teeth in the DOS and DOS/LAN worlds, so it was with much interest that I read your article on DOS-UNIX connectivity.

Our company has a relatively large Novell network and has converted some database activities from DOS to UNIX because DOS ran out of power. The conversion was very simple and without a large capital expenditure or retraining of personnel.

The product we used, Powerfusion from Performance Technology in San Antonio, Texas, was not mentioned in your article. Powerfusion is easy to use, but more importantly it is very fast, and with its print redirector installed we can print anywhere on our network.

Steven W. Riebel
Vice President Finance
CFO Data Race
San Antonio, Texas

Editor's reply: Thanks for the tip. We've given your letter to our Product Reviews Editor, who will look into the product for evaluation.

Connection Correction

Dear Editor:

"The DOS to UNIX Connection" lists Rapport as terminal emulation software. While it is a software program, it is not a terminal emulation.

Most people acknowledge that terminal emulations are a hassle to use. A "terminal emulation" forces the PC to imitate an established terminal. However, no original terminal type truly matches the PC and no amount of pretending can change the number and labeling of a PC's keys to match a Televideo or a DEC VT100.

As you state, "integrating both kinds of machines without creating new problems for the users is not a simple task." In order to optimize a PC as a terminal, the emulation should match the PC key for key and attribute for attribute–which is what we have done with Rapport.

If you use WordPerfect with Rapport, it doesn't matter whether you use the UNIX or DOS version of the program. The keystrokes are virtually identical, which is not the case with terminal emulations.

Finally, you mention that a reason to connect DOS and UNIX is to share data between DOS and UNIX users. Unfortunately, using an emulation program to transfer files between a PC and UNIX system has always been difficult and time-consuming and, as a result, is impractical for everyday users.

Terry J. Darby
Tundra Software
Ontario, Canada

Another Way to Connect

Dear Editor:

"The DOS to UNIX Connection" failed to mention StarNet's software product, Micro/X, which turns a PC into a low-cost X server.

Dick Montgomery
President
StarNet Communications
Santa Clara, Calif.

Had Trouble with SPARCstation 2 Review

Dear Editor:

In the June 1991 review, "Sun's Upscale SPARC 2," by Cimarron Boozer, the author says: "To the Cypress product, Sun added a hardware cache *flush* for the SPARC registers, yielding a 30 to 40 percent increase in context-switching time."

First, I hope Mr. Boozer meant "a 30 to 40 percent improvement," but secondly, since the registers are internal to the CPU, how could Sun have added hardware to do anything? And what is meant by a "hardware cache flush for the SPARC registers"?

continued

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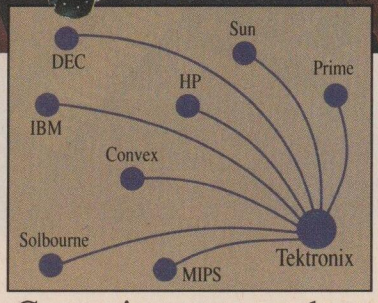

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CIRCLE NO. 231 ON INQUIRY CARD

provides a step-by-step installation option to install the software in the most efficient manner.

We are also looking into using utilities such as SCO's **custom** for users who can accept its limitations. Individuals wishing to "customize" the installation may still do so.

Wayne Painter
President
Six Sigma Case, Inc.
Bellevue, Wash.

More Options for Network Printing

Dear Editor:

The June 1991 feature, "Should Your Printer Be a Network Sprinter?" failed to make readers aware of a more economical way to obtain network printing: Ethernet printer servers.

Ethernet printer servers can serve multiple users from multiple networks. In addition, Ethernet printer servers typically have several parallel and serial ports. This enables users to take printers and/or plotters that do not support Ethernet and make them network resources. Finally, Ethernet printer servers also come standard with TCP/IP and LAT protocols, providing access to both UNIX and DEC hosts.

Keith Sugawara
Field Marketing Manager
Emulex Corp.
Costa Mesa, Calif.

Products Editor Howard Baldwin replies: Your point is well taken. I can only give my stock answer to complaints about omissions: the story focused specifically on what to look for in a networked printer. For a story on how to network a printer, there would have been many more alternatives. Incidentally, another name for a printer server is a terminal server, and we're far over quota for heated arguments about those.

They're Working on It

Dear Editor:

The feature on network printers gives a good overview of some of the management problems that can arise when a printer is directly connected to the network. At the request of users like Ms. Hemnes, Talaris now provides the ability to "keep track of output for auditing purposes."

Mr. Sivadon is correct that network printer vendors should take care of printer management issues, but planned enhancements and releases are better than ad hoc (or should I say ad hack) programming any day.

Dr. Patsy Campbell
Director of Marketing
Talaris Systems Inc.
San Diego, Calif.

The Case of the Missing Trade Show

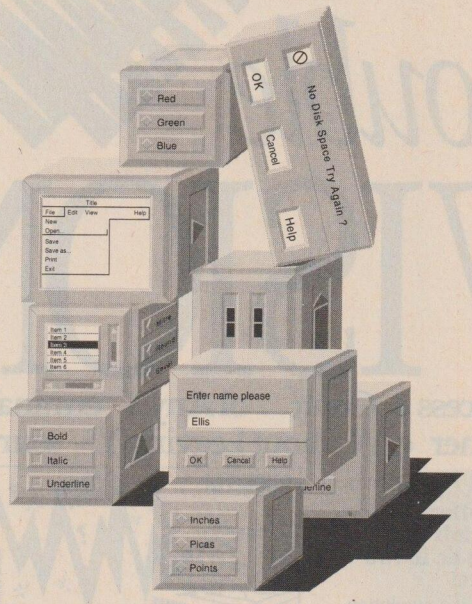
Dear Editor:

We're proud to be one of Mexico's most important nationwide UNIX value-added resellers (VARs). We have received *UNIXWORLD* for some years, and rely on it as an accurate source of information.

continued

XFaceMaker 2

THE OSF/MOTIF INTERFACE BUILDER



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CIRCLE NO. 50 ON INQUIRY CARD

Third, the machine is called SPARCstation 2, but the "unwashed" on Usenet insist on calling it S2, SPARC, or SPARC2. It's distressing to see a publication with the clout and good reputation of *UNIXWORLD* following this reprehensible shortening. The product name is critical. Saying "I have a SPARC" might mean you have a product from CompuAdd, Tatung, or Sun. Please stick with Sun's own name, SPARCstation 2.

Dan Mick
Project Manager
KFW Corporation
Thousand Oaks, Calif.

Reviewer Cimarron Boozer replies: We should have used the word "improvement," but except for semantics, we were correct. The standard CPU in the SPARCstation 2 is made by Cypress, but Sun did add cache controller logic, in the form of a chip, that acts as a flush for the SPARC registers. As for the headline, sometimes we take liberties to make the type fit. Sorry it offended you.

It's Not *All* Brain Dead

Dear Editor:

I must respond to a generalization made in the June 1991 "Mail" column in *UNIXWORLD*. John Michael Wagner writes, "Even the best selling PC software is brain dead." That is true because of the operating system that vendors use and not the applications themselves. However, one DOS vendor carefully thought out its UNIX product: WordPerfect.

WordPerfect files can be transferred from DOS to UNIX without changing the document. The screen interface and command usage are very similar, thereby reducing the learning curve when changing operating systems. This portability makes WordPerfect a powerful tool for multiple-operating system offices.

Tom Fortner
Computer Technician
Christian Medical & Dental Society
Richardson, Texas

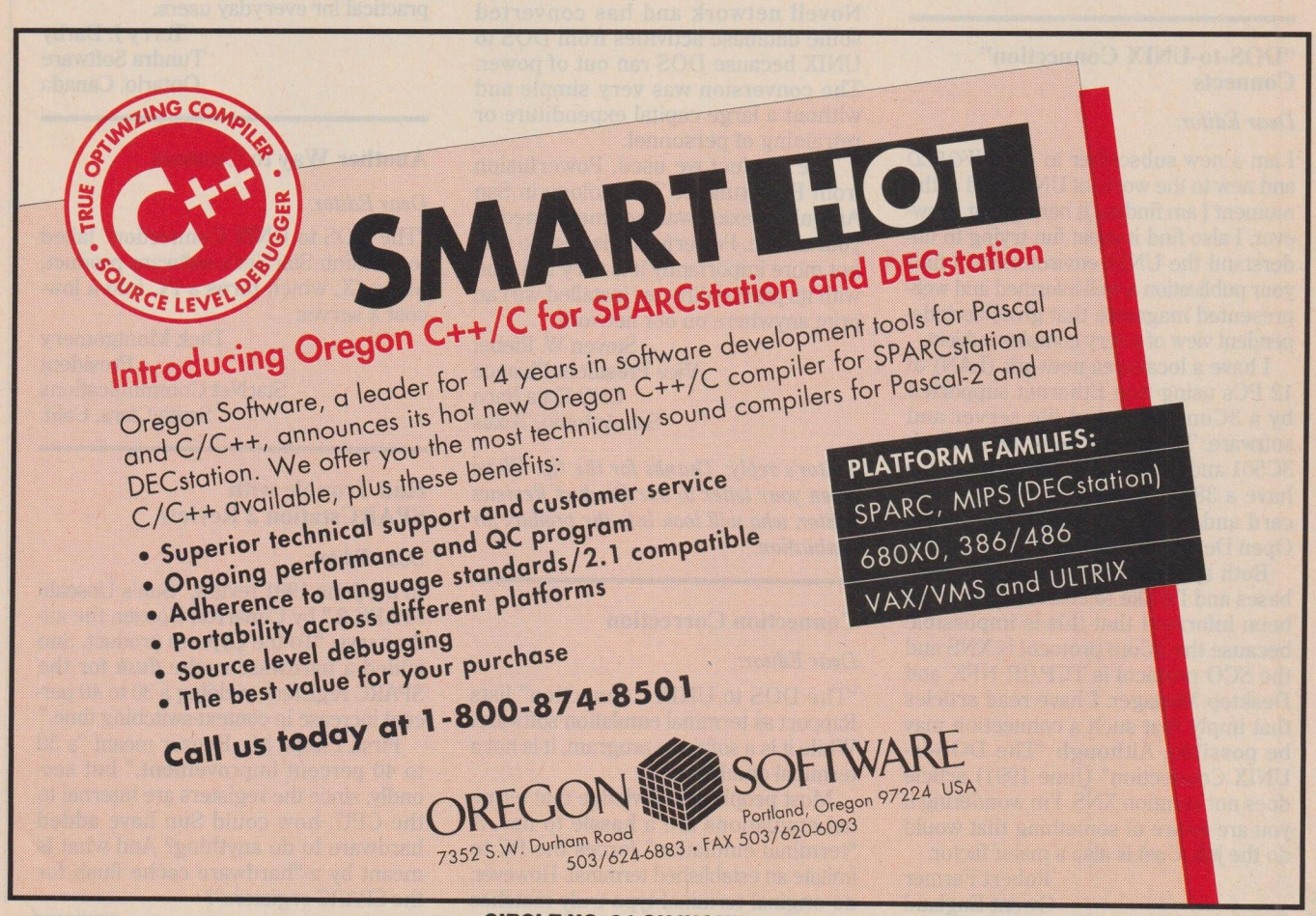
Canonizer Counters Review

Dear Editor:

I was pleased to read the June 1991 review of Canonizer. Reviewer Rick Farris successfully captures the essence of the product and the role it plays in designing databases. I would like to address some specific points raised in the article.

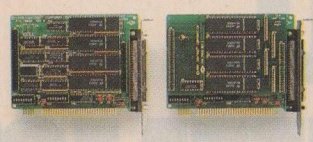
Mr. Farris also mentions that "the smallest tasks often become burdensome." I assume he is commenting on creating relations between items, the most complex aspect of data modeling. Identifying a relationship type between data items requires a certain amount of analytical skill which is only acquired though practice, regardless of the method employed. Canonizer provides a step-by-step approach to simplify the identification process.

The review indicates that the installation procedure for Canonizer is "unfriendly." Compared to some installation procedures, this may be accurate. As a result of Mr. Farris' suggestion, we have created a "QuickStart" procedure that

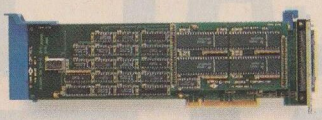


CIRCLE NO. 21 ON INQUIRY CARD

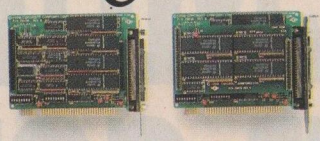
Comtrol Offers Multiusers Something Others Don't...



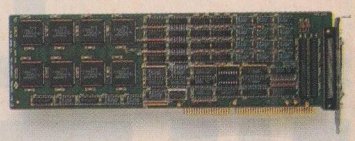
Hostess 4 and 8 Port Nonintelligent Serial Controllers



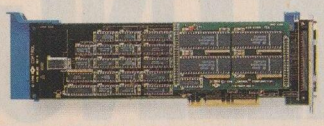
Hostess MC 4 or 8 Port Nonintelligent Serial Controller (MicroChannel)



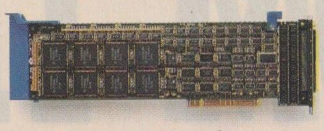
Hostess 550 4 and 8 Port Buffered Nonintelligent Serial Controller



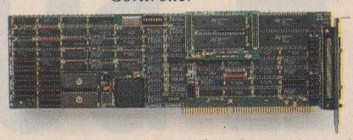
Hostess 550 16 Port Buffered Nonintelligent Serial Controller



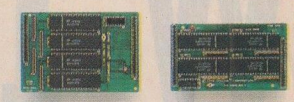
Hostess 550/MC 4 or 8 Port Buffered Nonintelligent Serial Controller (MicroChannel)



Hostess 550/MC 16 Port Buffered Nonintelligent Serial Controller



Smart Hostess 4 or 8 Port Intelligent Serial Controller



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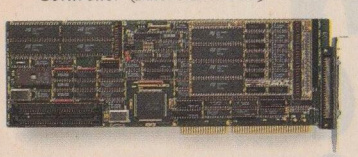
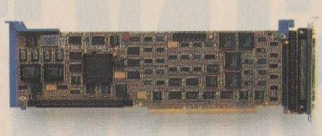
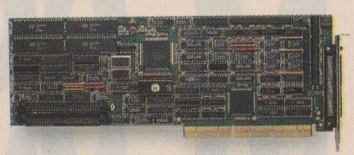


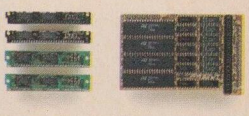
Hostess i 8 or 16 Port Intelligent Serial Controller



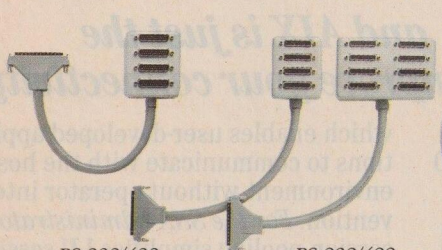
Hostess i/MC 8 or 16 Port Intelligent Serial Controller (MicroChannel)



Hostess i/E (EISA) 8 or 16 Port Intelligent Serial Controller

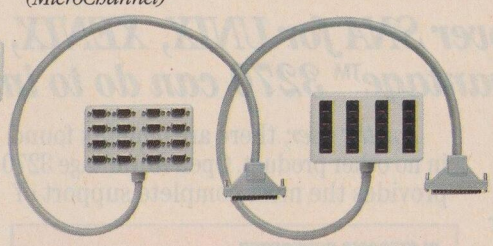


Hostess i Series Upgrades Memory and Port Upgrades



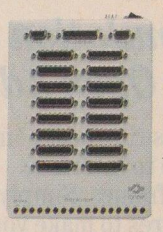
RS-232/422 25-pin Female (4 Port)

RS-232/422 25-pin Male (4 & 8 Port)



RS-232/422 9-pin Male (16 Port)

RS-232/422 RJ45 (16 Port)



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RS-232/422 9-pin Male (4 Port)

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CIRCLE NO. 149 ON INQUIRY CARD

Because of the announcement of UNIX Expo West in your April 1991 issue, six of our trained engineers took off to the Los Angeles Convention Center only to find that there was no such Expo. The cost of the trip was $1,980 in airfare alone.

We consider this matter as a lack of responsibility toward your readers' time and money. Who is responsible? What are you going to do about it?

David Federman
President, Avance
Mexico City, Mexico

Editor's reply: It is certainly unfortunate that you travelled such a long way without first verifying details about the show. UNIXWORLD *makes every effort to provide accurate information about trade shows each month in "Calendar." We reported that the show was cancelled in "Industry News" in our May issue.*

"Calendar" provides a contact telephone number so readers can verify the information we provide, preregister, and obtain further information. All readers should call the organizers of any trade show prior to making travel commitments.

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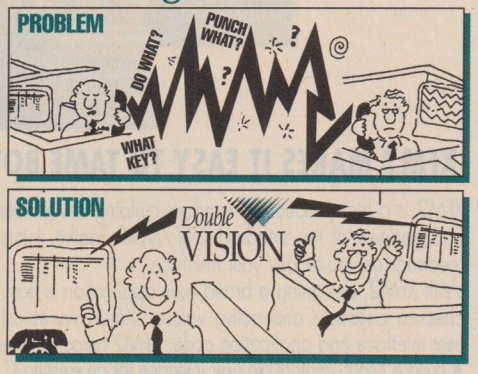

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CIRCLE NO. 8 ON INQUIRY CARD

Wants Details on Restricted Sales

Dear Editor:

I read with great interest the articles on Eastern Europe and the Soviet Union in "Special Report: International UNIX 1991." The articles are surprisingly close to reality. Your writers have done good work.

Our company is a UNIX-oriented VAR. We have contacted many U.S. companies to select products for our customers, and some of them have indicated problems in working with the U.S. Department of Commerce.

Please inform your readers of the history of UNIX restrictions and about the present ones. This should help not only UNIX-oriented companies in Eastern Europe, but their prospective partners in the United States as well.

Jindro Ruzicka
UNIX Dept., Varias a.s.
Zilina, Czechoslovakia

Editor's reply: We too are following the moves by CoCom and will consider an article about UNIX restrictions in a future issue. Thanks for your suggestion.

CORRECTION

In the June 1991 "Library" column, Kevin Reichard and Eric F. Johnson's book was incorrectly identified. The correct title is *Power Programming Motif.* ■

UNIXWORLD *welcomes letters to the editor because your opinion matters to us. If you would like to comment on past articles, or voice your opinion on an issue, write to us at 444 Castro St., Mountain View, CA 94041, or send us e-mail at either of the following addresses:* `uunet!uworld!letters` *or* `letters@uworld.com`.

All letters must include an address and daytime and evening telephone numbers. Postal letters must be signed. We reserve the right to edit letters for clarity and space.

Reviewed by Walter Zintz

TAKING CARE OF HIGH-TECH BUSINESS

Any technology as fundamentally new as computing creates a need for new business styles. The success stories in the high-tech industry are scattered among stories of companies whose founders had technical know-how, but not the business acumen to succeed. Here are three books aimed at technical people who want to prosper from the work they create.

Software Distribution: How to Develop a Successful Marketing Plan

By Frederick L. Cooper III
SoftChannel Publishing; 404-729-1336
Irregular pagination; 7 pages of Index & Contents
Hardside 3-ring binder with tabbed dividers;
$49.95

Small-scale, low-profile software distribution is the focus of this book. The author delivers most of his advice on three broad topics: determining whether the software in question is a feasible product; getting it into the right distribution channels on favorable terms; and moving safely through the minefields of the law and courts.

Cooper approaches product feasibility with a mixture of rigorous analysis and frank realism. Many entrepreneurs who read this book closely will see how they can turn a marginal software product into a probable success. Many others will discover that they have a very slim chance of making a profit from their software. Both groups will benefit from following Cooper's method of market analysis.

The marketing portion of book discusses trendy marketing techniques, such as working out strategies before thinking about objectives, and believing that emotion often overrules logic in the prospective buyer's mind.

Choosing and signing distribution channels is where Cooper's advice combines "win-win" strategies with hard negotiating. His trendy attitude toward marketing is replaced by hard, incisive analysis of channel types. Software developers will find this much like system analysis, but may be hesitant to apply these techniques to an area they've always considered nontechnical. This could be their undoing, because distribution channels are in the critical path to software markets and, if botched, could kill a software venture quickly.

Cooper is an attorney and uses dry, lawyerish caution when he discusses legal hazards and defenses, but he explains everything in pretty ordinary language. Perhaps too ordinary at times–a traditional attorney would shudder at a section headed "Objective: Write an Actionable Plan." Unlike his tell-all approach in other areas, Cooper's legal advice often stops short where the obvious next step would be to consult an attorney. Within this limitation, coverage and quality are quite good.

All this thoroughly structured advice is bolstered by a general bibliography and endnote references to works ranging from court decisions to popular books from Madison Avenue. Even more helpful are the worksheets supplied for some of the major analysis steps described in the book.

Looseleaf binding, and page numbering that restarts after each divider, allow for frequent, easy revisions of the book as the law or other factors change. Unfortunately, this also makes it difficult for the reader to know if pages are missing. My review copy had only a single page after one of the dividers, and it was unclear whether the text ended there or should have been continued on a missing page.

Review Highlights

Technical Level: Nontechnical
Understandability: Almost Crystal Clear
Summary: A practical technique for small- to medium-scale software marketing.

High-tech Ventures: The Guide for Entrepreneurial Success

By C. Gordon Bell with John E. McNamara
Addison-Wesley; 617-944-3700
387 pages; 14 pages of Index & Contents
ISBN 0-201-56321-5 hardbound, acid-free paper; $29.25

The author of this book is the famous Gordon Bell, the long-time technical chief of Digital Equipment Corp. and, more recently, a leading player in several ambitious high-tech startups. His free-wheeling, inspired style of breaking new ground in a technically rigorous industry may explain why this book's organization is as scattered as it is.

From the start, the authors target people who hope to launch a big, heavily financed startup and hanker for growth along the lines of Sun Microsystems. The advice given here is sound and basic enough, though, that kitchen-table entrepreneurs and managers of existing companies can profit from most of it. A colleague of mine who hopes to launch a book publishing house, specializing in general-market novels, found the ideas in this book well worth the cover price.

The book's strong point, and it's a very strong one, is the entrepreneurial managerial aphorisms that pack it from cover to cover. An aphorism is an enlightening piece of fundamental advice, stated in a sentence or two, that seems unlikely when you first read it. The longer you think on it, though, the more sense it makes.

Like good aphorisms anywhere, these pieces of insight are not validated by detailed explanations or statistical studies. Those that are not self-evident truths are backed by anecdotes about the experiences and ultimate fates of various high-tech ventures. It's a tribute to the authors' wisdom that most of their aphorisms are convincing on their own.

The authors have attempted to assemble an organized book, but didn't get very far. The chapter titled "The

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Product" mainly describes how to decide whether the product you've developed is marketable. Advice on analyzing market potential and developing a product to meet market demands occupies the first half of the "Marketing and Sales" chapter. Discussion of the marketing folly of preannouncing a product is found in the chapter "The Technology Balance Sheet." This comes after a long section on hiring and keeping the right technical people that was inexplicably not put in the chapter titled "The People."

The "formal checklist for measuring success" promised on the dustjacket seems to be the three-page Bell-Mason Diagnostic toward the end of the book. This document cries out for a thorough firming up–phrases as vague as "enhance the company's competence" or "a driven sales group" prevail. The same chapter offers preconstructed excuses for believing that almost any rule is so hard to meet that it can be soft-pedaled, or ignored entirely, with the rationale that the venture "does not adhere to the letter of the rule but has found a better way of adhering to the spirit." Many better checklists are scattered throughout the rest of the book.

Considered as individual paragraphs, this book is usually astute and frequently rises to brilliance. Unfortunately, the organization of this wisdom verges on being laughable. In another book this disarray might be a fatal flaw, but learning how to handle such unorganized material might help someone who hopes to launch a business from scratch, which is why I call this a worthwhile book at a very reasonable price.

Review Highlights

Technical Level: Nontechnical
Understandability: Lucid
Summary: Gems of entrepreneurial wisdom in a loose pile

The Professional Programmer's Software Copyright Handbook

By Joel B. Gilman
Specialized Systems Consultants; 206-527-3385
30 pages; 2 pages of Index & Contents
Softbound; $9.95

The author is a practicing attorney who specializes in high-technology business law and does not assume that you do the same. His book covers the basics of software and copyrights, and you don't need to know anything about copyrights, or law in general, to follow it easily.

In these few pages you get a rundown of what to do and what is possible to do when establishing copyright protection for your software. Topics range from filling out the copyright form to determining whether your program is a "work for hire." Should your copyright situation get any stickier than this, the author leaves you with a short bibliography and sage advice on knowing when to call in a lawyer.

Copyrighting is an area in which you can establish your basic protection simply and easily. Only when infringers attack your product do the legalities become difficult. That's why a super-simplified book like this make sense. This book is the right tool for programmers who don't protect the code they write because they don't recognize its market value until infringers are already stealing it.

Review Highlights

Technical Level: Nontechnical
Understandability: Almost Crystal Clear
Summary: A quick rundown of the simple requirements for gaining copyright protection

Book Briefs

Despite the glories of UNIX, there are times when it's necessary to know something about the workings of a rival operating system–if only to be able to explain why UNIX is the better choice.

If you're facing Klaus Wirth and company's latest brainchild, Oberon, you can find technical help in *The Oberon System* by Martin Reiser (ACM Press & Addison-Wesley). It's a moderately detailed tutorial and manual that is strong on concepts, and covers both the operating system and its programming language.

Exploring CTOS by Miller, Crook, and Loy (Prentice Hall) tells the story of a message-passing, X86-based operating system that has an installed base of close to one million systems. This book mixes a general technical overview with a history of CTOS, both told by the system's friends. ■

Editor-at-Large Walter Zintz is the advisor emeritus to Uni-Ops Books in Boonville, Calif.

Omri Serlin

UNIX INCHES CLOSER TO OFF-THE-SHELF SOFTWARE

The Open Software Foundation has another potentially winning product. Like the Motif graphical user interface that came before it, ANDF (Architecture Neutral Distribution Format) will help establish OSF's success as a vendor of standardized products. This success comes despite the extremely slow progress of OSF's main product, the OSF/1 operating system kernel.

ANDF promises to extend the advantages of off-the-shelf or shrink-wrapped software to architectures that are *not* binary compatible. The product's goal is lofty: software developers will develop just one version of a UNIX application. It will execute correctly on a variety of platforms that are not necessarily compatible after a largely automated installation process. So, if you wrote an application on UNIX for an Intel 386 machine, it would run on a SPARC-based machine. Software developers could then distribute their products in "shrink-wrap," binary-like format, much as PC software is distributed today.

Software developers love shrink-wrap software, and for excellent reasons. Maintaining only one version of the program for a wide variety of machines greatly expands its market. At the same time, it reduces the labor required to tailor software to the idiosyncrasies of individual platforms.

Distributing the software in binary, rather than source, format means developers can keep tighter control over their products. This type of distribution prevents users from tampering with the code and forces would-be copy-cats to do a difficult reverse engineering job, rather than slightly modifying and reselling the source code.

Why ABIs Aren't Enough

A major limitation currently constricts the success of shrink-wrap software: it works only when all of the target hardware has many things in common, including a common machine-level instruction repertoire, such as the Intel x86 repertoire in IBM PCs and compatibles. Furthermore, all target platforms must comply with a formal or *de facto* Applications Binary Interface (ABI) software standard. In the PC case, the *de facto* ABI standards are the conventions established by the Microsoft and IBM system software.

Until now, shrink-wrap software has been slow to materialize on the UNIX scene. Interestingly, this a direct result of UNIX's greatest advantage–its ability to run on a wide range of target platforms featuring diverse architectures. UNIX itself is distributed in source format and must be transported, or ported, to any new architecture via a fairly complex process. Recompilation, hand-fixing, and augmentation of the generic UNIX source code are the minimal requirements. Hence, machines that run UNIX are not required to exhibit the architectural homogeneity of PC clones, for example. Furthermore, there were no formal or *de facto* ABIs for UNIX until recently.

ABIs for UNIX began to appear with System V Release 3 (SVR3). Unfortunately, they were mostly low-level binary compatibility standards, barely sufficient for supporting shrink-wrap software. With AT&T's UNIX SVR4, a more sophisticated series of UNIX ABIs began to appear.

In SVR4, the UNIX ABI has been split into two parts. One is a generic portion, the so-called GABI, which standardizes those aspects of the ABI that are largely machine-independent. The GABI in-

OSF's Architecture-Neutral Distribution Format

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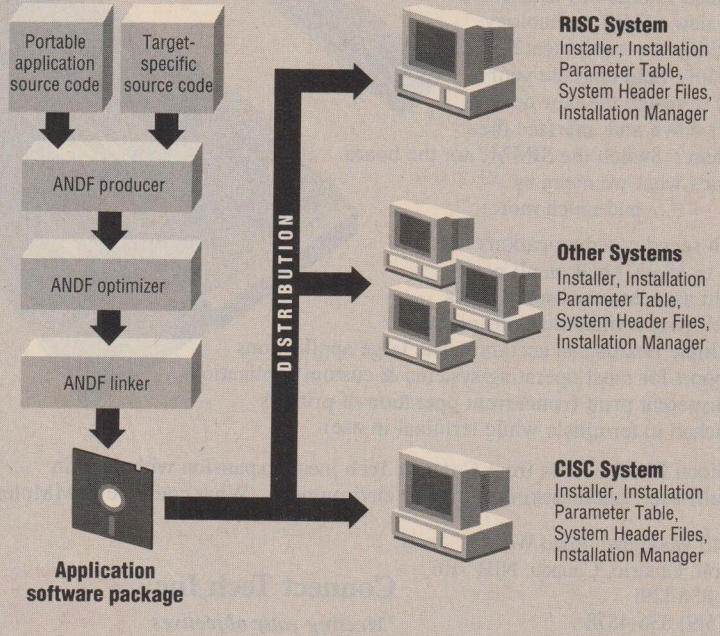

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cludes such requirements as compliance with version three of the X/Open portability guide (XPG3) and the X Window System (more specifically, release four of X Version 11) standards.

The second part of a UNIX SVR4 ABI is the machine-dependent portion, which applies to one class of machines that feature a common instruction repertoire. The generic ABI was created as a cooperative effort of AT&T's UNIX System Laboratories (USL), UNIX International (UI), various architecture-specific consortia (such as 88open and SPARC International), and vendors such as Intel and MIPS. The architecture-specific ABI portion is generated by the vendor of the architecture, or by the consortium dedicated to promoting the architecture.

SVR4 ABIs currently exist for the Intel 386, Motorola 88000 and 68000 families, and SPARC. ABIs for the Intel 860 and the MIPS architecture are in the process of being defined.

While the SVR4 two-level ABI concept brings UNIX closer to the reality of shrink-wrap software, it still requires that the target machines for each version of the software feature a common instruction set architecture. Furthermore, because SVR4 itself is fairly new, and its ABIs even newer, the selection of UNIX software available in shrink-wrap format at this point is quite limited. Because the installed base of each architecture for which a UNIX ABI exists is still relatively small, the selection of shrink-wrap software is increasing at a relatively slow pace.

Now Work Begins on ANDF

Now comes OSF with its ANDF proposal. ANDF is a drastically different notion that promises to greatly accelerate the availability of UNIX-based shrink-wrap software by bringing many architecturally diverse platforms under the umbrella of a unified distribution standard.

It could be argued that ANDF is merely a tactic designed to compensate for OSF's key product, the OSF kernel, which has been so slow to catch on. Critics might point out that although the ANDF Request for Technology (RFT) was launched in April 1989, until quite recently, OSF considered ANDF a "back burner" issue. ANDF's sudden thrust to the front may suggest more delays with OSF/2, the promised industrial-strength version of the kernel.

Even so, if the ANDF proposal is as successful as Motif was in garnering industry support, it will have a dramatic impact on the availability of UNIX software, and greatly accelerate the rate of the acceptance of UNIX itself. Beyond that, by providing application portability across diverse platforms, ANDF will finally make the "open systems" promise a reality.

Twenty-four companies submitted technology for ANDF, and 15 were judged by OSF to be qualified. By February, the selection was narrowed to four finalists. There was HPCode-Plus from Hewlett-Packard, produced in cooperation with the University of Virginia; PAL from Peritus International with Lucid Inc.; ULS from Siemens-Nixdorf; and TDF from the Electronics Division of the U.K.'s Defense Research Agency (DRA), previously the U.K.'s Royal Signals and Radar Establishment. In June, TDF was officially selected.

As with previous RFTs, OSF published a "Rationale" document explaining why TDF was chosen. Cynics might say that despite the well-reasoned Rationale document, OSF selected a proposal from a government agency mainly to minimize any possible legal exposure. Complaints against OSF by some software vendors offering technologies competing with OSF selections are being investigated by the Federal Trade Commission.

How Will ANDF Resolve the Disparate ABI Issue?

The essence of the ANDF technique is to separate the software creation process into two stages. In the first stage, the application is compiled by a language translator called a "producer," which acts much like the front end of a conventional compiler. A separate producer will be required for each programming language. Instead of generating machine code, the producer emits an architecture-independent intermediate language (IL). This language, like a machine language, is coded in binary format. But, unlike a conventional machine language, the ANDF IL retains information contained in the source language programs, including program block structure and control flow. The ANDF IL is what will be distributed in shrink-wrap form.

The second stage will be done by architecture-specific "installer" software. The installer, assisted by an installation parameter table, system header files,

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and an installation manager, will convert the ANDF IL to executable code for the specific platform on which the Installer runs. Thus, shrink-wrap ANDF software should run on any platform supporting an ANDF installer.

The selected ANDF technology from DRA already has a C-language producer that runs on several architectures, including MIPS, Intel 386, Digital Equipment Corp. VAX, SPARC, Motorola 68000, HP Precision Architecture, and IBM's RS/6000. The same Producer technology is said to be extensible to C++, Fortran, Cobol, and Ada.

Prototype installers are already available on the DEC VAX and MIPS architectures, both running DEC's Ultrix; and on the Intel 386 or 486 running The Santa Cruz Operation's UNIX. Under development is an installer for the Sun SPARC architecture running SunOS.

Key concerns with any dual-stage translation process are execution efficiency and file sizes. OSF reports that the ANDF translation process has so far entailed only about a three percent execution speed degradation, compared to code emitted by the conventional, non-optimized native compilers for a given platform. Relative to the best compilers available for a given platform, ANDF typically resulted in a degradation of from 15 to 24 percent. However, in one interesting case, an *improvement* of five percent was noted.

ANDF file sizes are typically larger than native executable files by a factor of 1.3 and when compressed ANDF was compared to compressed native files it was larger by a factor of two.

In installation time, the selected ANDF technology was faster than a complete build from source using a native compiler. This is not unexpected, because much of the work involved in parsing, optimizing, and link-loading takes place in the ANDF Producer.

Will ANDF Work?

The concept of shrink-wrapped software is immensely attractive to users searching for open systems application portability, and for software developers interested in maximizing the market for their products. The price of these advantages is performance degradation. Independent software vendors will have to decide whether the competitive advantage afforded by a native implementation of a given application is worth more than the economies of cross-platform portability.

Users will have to decide whether true application portability, along with possibly lower application costs, outweigh ANDF's slightly degraded execution speed, slightly larger files, and the space taken by the Installer component.

We may have to wait awhile for the answers to these questions because ANDF will not be generally available until 1992. I for one think that in ANDF, OSF has a winning product on its hands. I would not be at all surprised to see OSF's arch-rivals UI and USL signing up for the OSF ANDF concept as well. ■

Editor-at-Large Omri Serlin heads ITOM International Co., a consulting and research firm based in Los Altos, Calif.

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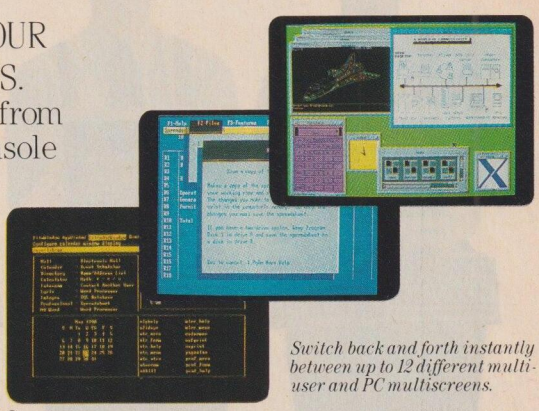

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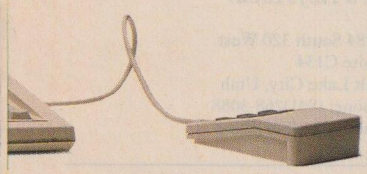

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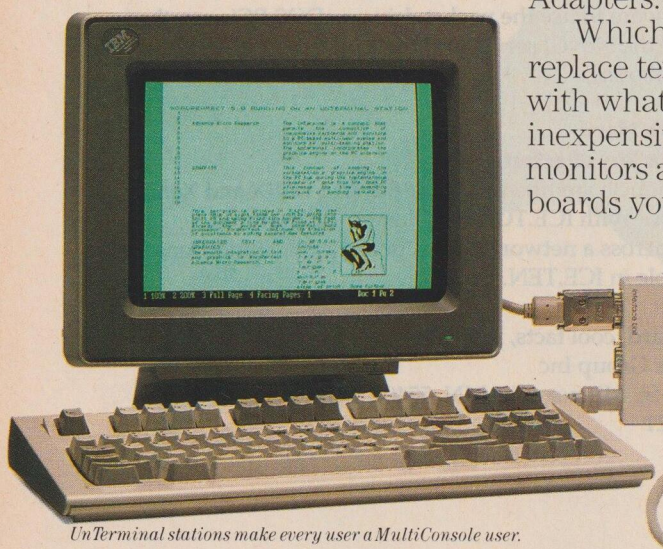

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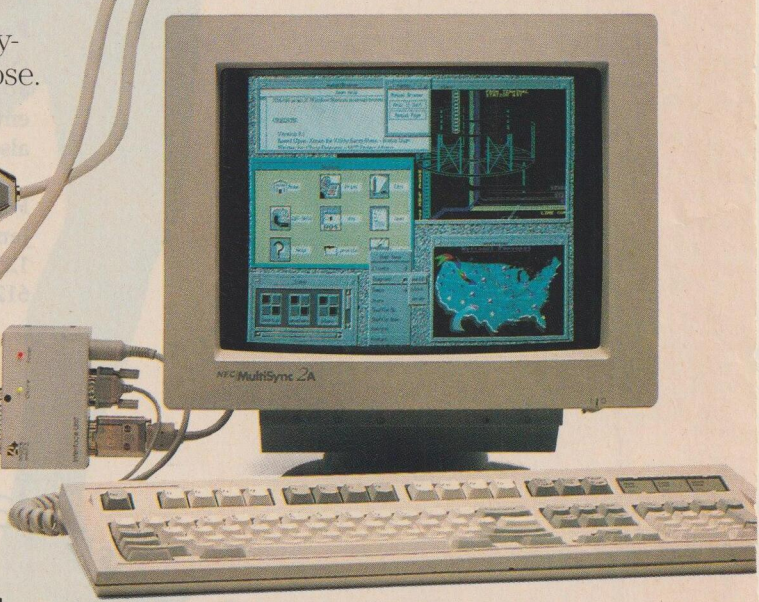

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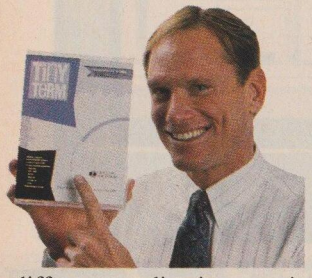

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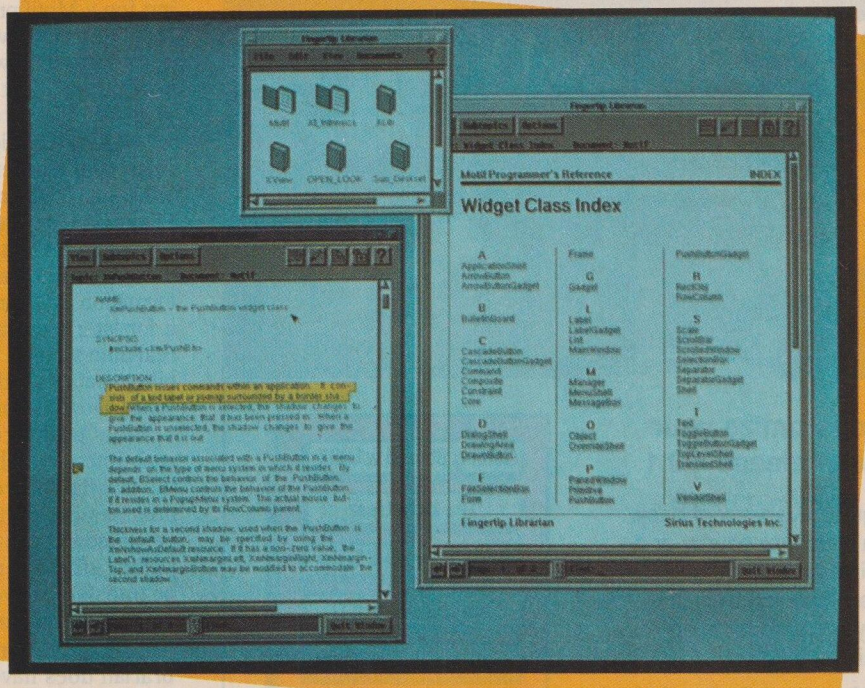
CIRCLE NO. 65 ON INQUIRY CARD

Getting Sirius About Documentation

By Howard Baldwin



Fingertip Librarian text-retrieval software from Sirius Technologies lets you index and have easy access to online text

Gia Rozells Kuhnert, president of Sirius Technologies, tells the story of a group of 45 Motif programmers that shared three sets of manuals. One person needed information about a particular command, but couldn't find it in the index. Eventually, the whole group stopped what it was doing and flipped through the manuals page by page to find what he was looking for.

This summer, Sirius unveils its solution for "smart" information retrieval with its Fingertip Librarian software, an X-based program for text retrieval. Using online documentation, you can access information via a "keyword" search. No longer will you have to leave your desk to find the manual, nor spend an entire afternoon trying to find what you want.

At the same time, Sirius will debut three online texts for use with its software. *The X Reference Series* has information on Motif, `Xlib`, and Xt Intrinsics. *The Sun Reference Series* has information on Open Look, XView, Xt Intrinsics, and DeskSet Tools. *The UNIX Reference Series* covers UNIX commands and programming. The latter is included in the $495 single-user price of the Fingertip Librarian software; the others cost $195 each.

You can send a tape of any documentation that your company uses–employee benefit manuals or style guides, for instance–to Sirius to have your text integrated with the Fingertip Librarian software. This falls into the category of Sirius' "consulting services," which are priced based on the complexity of the project.

Sirius faces a challenge in that it is coming late to the UNIX-based text-retrieval market. Verity's Topic text-retrieval software almost had the market to itself when it was released in 1989. Last year saw the debut of several text-retrieval products, including Cuadra's Star, Thunderstone's Megamorph, ZyLab's ZyIndex, and Third Eye Software's Elexir. Sun Microsystems recently completed its own CD-based online documentation using Fulcrum Technologies' Ful/Text, another competitor of Sirius.

Another challenge is that a developers' kit that will allow internal programmers and value-added resellers to create their own online documentation systems won't be available until the second version of the software is released. Kuhnert would not specify a release date other than it would be before the end of this year.

A final criticism is that The Fingertip Librarian does not allow Boolean searches, as most text-retrieval software does. Boolean searches look for words only as they relate to other words, such as looking for instances of the word *Cadillac* only if they modify *convertible*. This feature is scheduled to appear in version two. Finally, the product only runs under X Windows on Sun, Hewlett-Packard/Apollo, and IBM workstations. Many of the other text-retrieval products run on multiple operating systems.

Despite these current shortcomings, the Fingertip Librarian presents a remarkable low-cost opportunity for companies, resellers, and independent software vendors to create their own online reference libraries. Users in a large corporation could use the Librarian to access an online help screen that might have a FAQ (frequently asked question) list as well as documentation for the soft-

ware they use. This way, workers wouldn't have to ask for help and you could conceivably introduce new software programs without a slowdown in productivity.

Further, although it costs less than its UNIX counterparts, the software still contains the fundamentals of text-retrieval use. Like the competing products, Fingertip Librarian lets you create "hyperlinks" that let you browse through related material without doing it sequentially. You can also customize the software in several different ways. Just as you would stick a Post-it note in the margin of a document as a bookmark, you can annotate pages within the documentation with comments. You can also "dog-ear" the page if you refer to it frequently, as well as highlight the appropriate text. Having used one of these three marking techniques, you can create custom indexes of dog-eared, highlighted, or bookmarked pages.

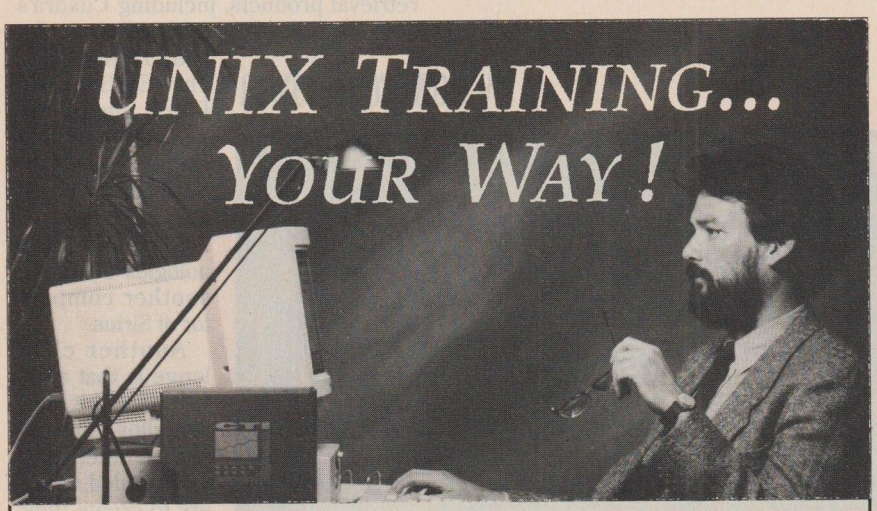
According to Kuhnert, you can follow the same format with a group across a network. By creating a group password, users or co-workers can leave pertinent messages for each other that others don't need to see. "If you and I are both working [on a Motif project], I can rearrange the index and give you a tutorial. If I've gone through how to create a windowing system, you don't have to search it down yourself. You can search for it yourself."

While text retrieval is most commonly related to reference documents or archive materials, much of the interest in Fingertip Librarian has come from the financial community, says Kuhnert. These users want to access stock and trading information as it comes in, as well as index it for later perusal. Verity's Topic has a real-time version that handles this capability that is used as the basis for Dow Jones' Dow Vision information service.

Sirius' product does not yet have such real-time capabilities, nor are they on the drawing board. "Ours is a meat-and-potatoes product," says Kuhnert. "It's designed to be turned into a developers' package that can read manual pages and be transferred over the net."

While it may not have the extensive features of its competition, Fingertip Librarian does have the advantage of being less expensive. Its single-user price is $495 (which includes both the software and the *UNIX Reference Series*; network and multiuser discounts are also available), with release set for July. By comparison, Verity's Topic is $795 on the desktop, not to mention $15,600 for the server software. Cuadra's Star is $2,000 per user. Each have network licensing terms available. The Fingertip Librarian is initially available on workstations from Sun, HP/Apollo, and IBM.

The Fingertip Librarian may fit most closely into a situation where someone is always stealing your dictionary, style guide, or running down to personnel to ask benefits questions. If you're looking for a low-cost reference solution, and your users or programmers don't need text-retrieval software's counterpart to a *Cadillac convertible*, this puts the library at your...well, fingertips. **Sirius Technologies, 3456 Mt. Ariane Dr., San Diego, CA 92111; 619-467-1342.** ■



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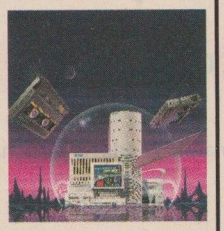

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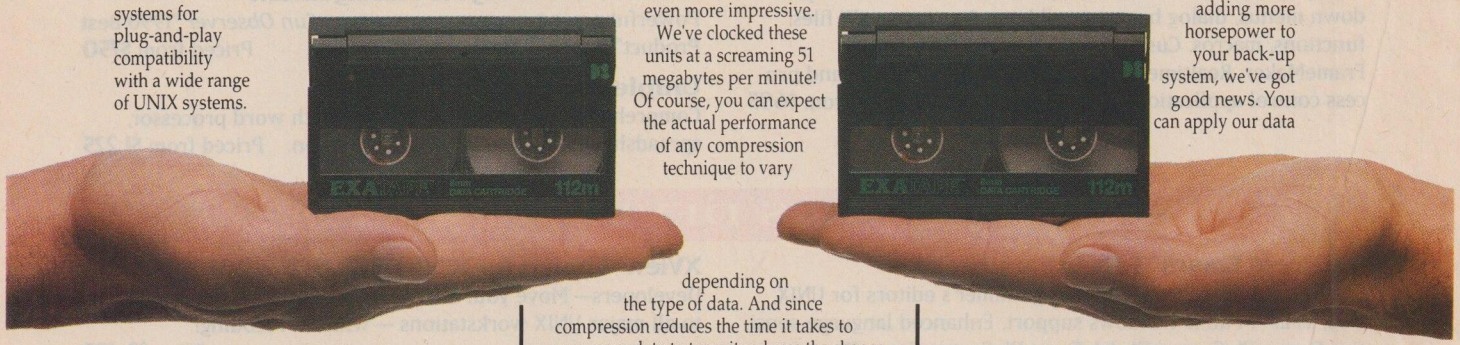

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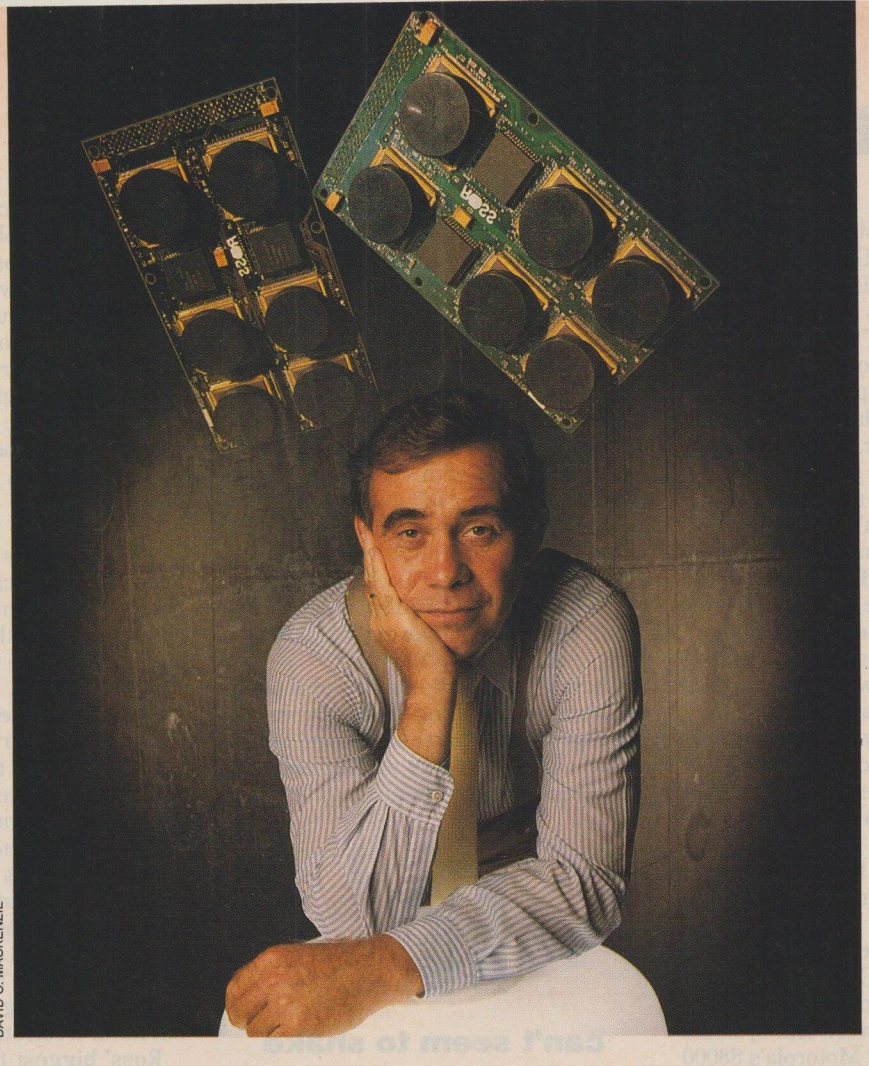


DAVID C. MACKENZIE

"All smart people are stubborn. That's a good trait."

—Roger Ross, President and CEO, Ross Technology Inc.

PROFILE

A Chip On His Shoulder

By Gary Andrew Poole

FROM HIS FOURTH FLOOR OFFICE, Roger D. Ross–the father of Motorola's 88000 RISC chip–peers down at the countryside surrounding Austin, Texas. Green oak and cedar trees cover the lush landscape and Ross seems content, until his eyes meet a sprawling brown building. His eyes freeze in a glacial stare.

"See that building?" he says, pointing at the building owned by Motorola. "I chose this office for one reason: I want to look down at Motorola every day."

Ross, 45, has been railing against his former employer, Motorola, since I met him two hours earlier. As the former general manager for the Advanced Microprocessor Operation, Ross left in disgust three years ago. He says there was a lack of commitment toward the 88000 from his superiors. As a result, Motorola lost many deals for reduced-instruction-set computing (RISC) systems, including a large agreement with Sun Microsystems.

Today, as president and CEO of Ross Technology Inc., Ross is fully committed to Sun, a Motorola competitor. His company makes Sun's SPARC chips for

the SPARCstation 2. Ross Technology will soon announce its new chipset for Sun's high-speed "Galaxie" workstations, according to industry sources. And the company is reportedly working on the "Pinnacle" chipset for Sun's next generation of workstations.

Ross says his company, a subsidiary of Cypress Semiconductor, made about $50 million last year. He claims he is selling more RISC processors than Motorola. But Ross' new-found loyalty toward SPARC doesn't remove the sizeable chip on his shoulder he carries against Motorola. He says he would still be working there if his supervisors had given him more economic authority. He says he was discriminated against because he was labeled a "scientist" and not a "businessman."

"Motorola is guilty of never promoting a scientist," he complains. "They had a technical career ladder, but they wouldn't share economic decision-making authority."

"Roger wanted to be empowered to do everything," counters a senior official at Motorola.

"Roger is convinced that his way is the only way," says Tom Mace, president of the 88open Consortium Ltd., an organization of software and systems suppliers supporting Motorola's 88000 processor.

Motorola later sued Ross for allegedly conspiring to steal trade secrets. It won a small victory–a one year injunction that prevented Ross from hiring Motorola employees involved with the 88000. An anonymous source says Motorola filed the suit to preclude a mass exodus of its design team, to ruin Ross' credibility, and as a slowdown tactic.

Pure Determination

Despite the ill feelings surrounding his departure from Motorola, Ross' staunchest enemies admit he is "brilliant," a "leader," and a "very strong influence" in the industry.

One of the most succinct descriptions of Ross comes from Dave Ditzel, director of Sun's advanced systems group, who has known Ross for six years. "He's a strong-minded, kick-ass, Texas-type guy," he says.

If being a strong-minded, kick-ass, Texas-type guy means not being ostentatious, Ross certainly fits the description. The day I talked with him he wore jeans, multi-colored topsiders, a white shirt, and a peach-colored knit tie. We held most of the interview at a Taco Bell.

Despite appearances, Ross likes to portray himself foremost as a businessman. "The world sees me as a scientist," he says, crunching into a taco. "I've never liked that term. I consider myself an entrepreneur and a believer in the free-market system."

"Roger has a big ego," says his boss T.J. Rodgers, president and CEO of Ross' parent company Cypress Semiconductor, "but the ego goes away when he's faced with a problem. He has an overwhelming will to succeed."

Rodgers says Ross is adjusting as his company goes through rapid growth. "He has a technical background, but he's learning how to run a company. He's wrestling with an octopus," Rodgers says.

Actually, Ross has more of a pure science background than a business background. He graduated cum laude from Ohio University with a bachelor of science degree in abstract mathematics. For three years Ross was a visiting professor of computer science at Ohio University, where he helped establish the branch campus computer science program in a joint project with NCR Corp. Then he spent nine years at NCR in its engineering organization, working on the popular Tower minicomputer line.

Ross can't seem to shake the demon of being pigeon-holed as a scientist

Not Your Average Mad Scientist

"The easiest knock you can give a guy is calling him a mad scientist," says Ross. There's touch of frustration in his voice. Ross can't seem to shake the demon of being pigeon-holed as "just a scientist." He wants economic power.

That desire stems from his impoverished past. "My parents didn't have any money," he says. He grew up in southern Ohio where his father worked as a small contractor and a farmer. His mother did clerical work. They didn't finish high school. Despite the family's lack of money, Ross says he always had a feeling that he would be successful. "I never had self-doubt."

Ross wanted to go to college, but a lack of financial resources forced him to drop out of high school and join the Air Force. In the Air Force he took a GED test and scored the highest score ever recorded on such a test in the Air Force, he boasts.

"I'm brilliant," Ross says matter-of-factly. Despite his acute intellect, some Ross observers call him "too quick to change" his stance. "You can have a conversation with him and he'll take both sides of the argument," says one Motorola official.

And then there's the infamous Motorola press tour in 1988 when Ross was stumping for the 88000. In meeting with reporters, he bashed the competing SPARC design, says Valerie Rice, a reporter with the *San Jose Mercury News*. Two weeks later his new company began designing SPARC chips.

"He bailed," admits Zach Nelson, now a PR person at Sun who accompanied Ross on the tour. Adds Rice, "You expect marketing people to lie to you, but never a scientist."

Ross' biggest fault is probably his stubbornness. It borders on the irrational. In ninth grade he built a Geiger counter and took it to a science show. "The judge only gave me a C rating on it because he was sure my father had helped me build it," he says, seemingly still upset. "Of course my father didn't know anything about electronics. I did it totally on my own." Who gave him the dreaded C rating? An electrical engineer. "After that experience, I told myself, 'I will never be an electrical engineer,'" he says. That's why he decided to get a degree in a pure science–mathematics. "All smart people are stubborn," he adds. "That's a good trait."

Obsessed with Success

It's hard not to be caught up in Ross' enthusiastic aura. "He's full of energy and enthusiasm," says Doug MacGregor, CEO of Solbourne, who worked for him at Motorola. "I liked working for him."

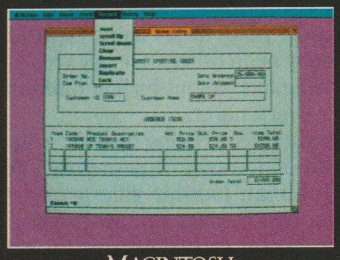
"His persona to me is that of a mentor/coach/Marine Corps general," says Steve Goldstein, Ross' director of strategic planning. "He builds winning teams."

"He has tons of energy," adds Sun's Nelson. "He gets people pumped."

If nothing else, say his colleagues, Ross is an evangelist for his chosen causes.

continued

Avoid The Whole Gui Mess.



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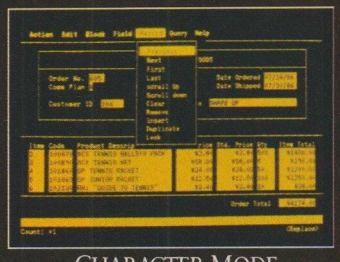

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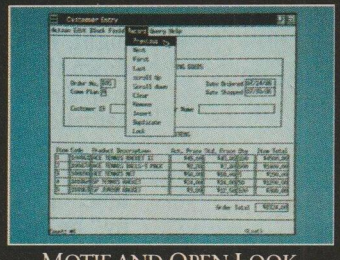
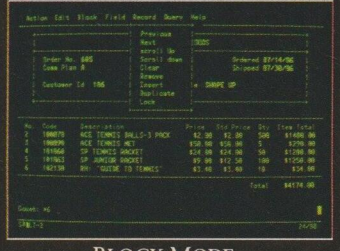
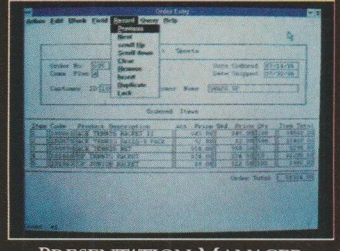


MOTIF AND OPEN LOOK



BLOCK MODE



PRESENTATION MANAGER

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After Motorola, the failure of the United States to continue its economic superiority is Ross' most obsessive cause. "These large divisionalized monsters are inept at dealing with Japan because they don't draw on the strength of America," he says. "The free market system is the greatest teacher of them all. The free market isn't left wing or right wing. It is a force that can be a source of tremendous incentive."

Ross says he gets many of his economic ideas from Rodgers. Ross calls himself a Rodgers "disciple." "I'll give the guy some credit," laughs an anonymous source. "He gets along with T.J. Rodgers, which is a feat in itself."

He reverently talks about the economic lessons Rodgers has taught him. "I want to make T.J.'s dreams come true," he says. He almost becomes dewey-eyed when he talks about the "decision-making authority" Rodgers has given him. Of course, Motorola is the constant villain in this thinly veiled play scripted by Ross.

"At Motorola, you're denied seeing the customer," he says, shaking his head. "Engineers are in caves. They're denied the most important thing: contact with the customer. In the free market system, the customer is king. Whatever the customer says goes. He's never wrong."

"I'm absorbed by that," he says.

Religious about Quality Time

He's also absorbed by his personal life, which centers around spending time with his wife, two sons–18 and 14 years old–and two daughters–15 and 10. They like to swim, sail, and bicycle together. "I'm a workaholic other than the times we go out as a family," he says. "I like to set aside time when we enjoy each other." He says his family is "religious" about having dinner together every night.

He tries to bring a sense of family to the office too. "I remember Murray Goldman [senior vice president and general manager of Motorola's microprocessor group] making his wife sit in the lobby," says Ross, visibly disgusted. "He wouldn't dare let her in because it was against regulations. It was late at night. I told him, 'Don't make her sit down there.' He wouldn't break that stupid regulation. He was afraid. That's pathetic," he says shaking his head.

Ross says his employees are welcome to bring family members in at any time. "This is a family-oriented company," he insists.

Roger Ross' office is a little cluttered. His children's school artwork hangs on his walls. He turns from his window, away from the brown Motorola building below. "I'm a philosophical person," he says. "SPARC has a philosophy behind it: proprietary products ultimately lead to hardening of the arteries. At Motorola I couldn't have conceived of that philosophy."

He tries to remain somewhat diplomatic about Motorola, but he's not very convincing. He crosses his arms and looks at me. "I really don't have an axe to grind with Motorola," he says. "Vengeance is a terrible motive." ■

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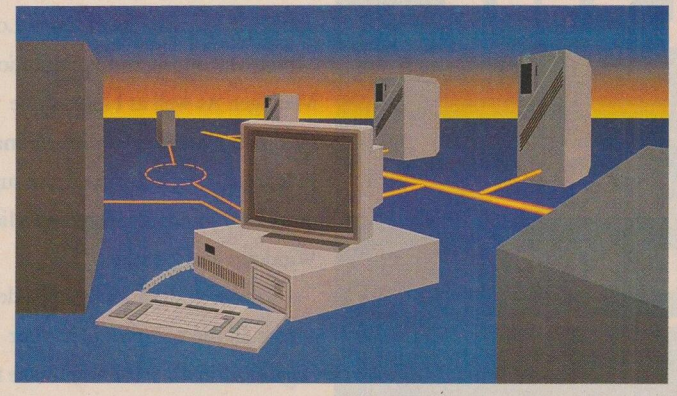

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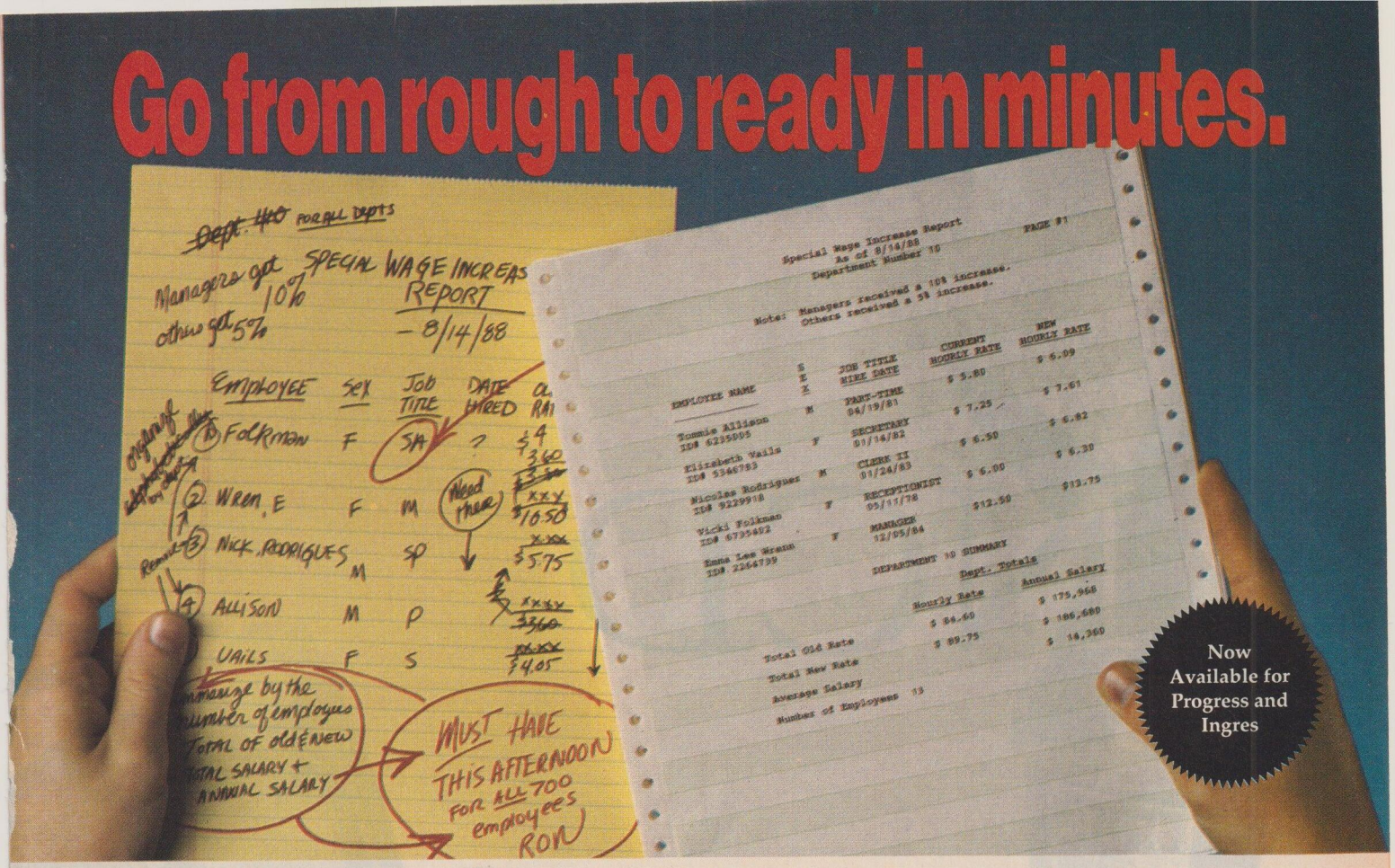

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Xenix	●	●	●	●	●	●	●				●	●	●		●
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VAX / VMS	●	●	●		●			●	●					●	●
AOS / VS	●	●													●
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Friendly Desktops

As the X Window System and Motif become more important to users and businesses, the subject of desktop managers also becomes more important. A desktop manager is the primary interface between you and the computer. A good one is unobtrusive, if not invisible. It is part of your computer like a dashboard is part of your car. The Open Software Foundation (OSF) released Motif in 1989 without a built-in desktop manager, so many companies have since released their own products to ride atop Motif. Releasing an incomplete graphical user interface (GUI) was a strange choice by OSF, a company that cares so much about look-and-feel issues. But at the time, pressure to release Motif outweighed completing it. Desktop managers for Motif and other UNIX windowing environments run on workstations, X terminals, UNIX PCs, and even DOS PCs running X server software. The main mission of a desktop manager is to let you graphically roam through file systems and launch programs. This is so important that other windowing systems, most notably the Apple Macintosh, bundle file navigators. But not Motif. After file navigation come many smaller missions. Most of these focus on the relationships that icons have to each other and to applications. For example, desktop managers usually let you drag a data file icon, such as a document or spreadsheet file, and drop it on an application icon, such as Microsoft Word or Lotus 1-2-3. The net result is the application opens with your file in it. Desktop managers also offer various utilities to control your system, including a control panel to set system preferences, a help system, and an icon editor to make your own icons. If you haven't used desktop managers, the lingo of the desktop makes it hard to read about them. Icons, drag-and-drop, and minimize are three terms taken for granted by desktop users, but alien to UNIX users on ASCII terminals. If you're in this group, here are a few visual tips: icons look like postage stamps, drag and drop describes what you do with the icons, and minimize is one way of turning an

GERRY ZAGER

BY ALAN SOUTHERTON AND STEVE MIKES

application into an icon.

Because desktop managers are supposed to be unobtrusive, it's difficult to distinguish a fair desktop manager from an excellent one. But we donned our x-ray glasses, and in this review of desktop managers, we can unequivocally say that Looking Glass Professional from Visix Software is good, HP VUE (Visual User Environment) from Hewlett-Packard is better, and X.desktop 3 from IXI is excellent.

The one problem with desktop managers is that unless you're a big enough customer to specify customized software, you can forget about convincing the boss to buy the desktop manager you prefer. The decision is made among the vendors–like SCO and IXI, or Intergraph and Visix. This is true for software engineers as well as application users. Only an ambitious power user assembling his or her own X environment is likely to pay the $550 for VUE, or $795 for Looking Glass or X.desktop.

A Highly Configurable Tool

Beyond features, desktop managers strive to give you tools to change the appearance and behavior of the desktop. In other words, they are highly configurable.

Configuration issues vary. They range from creating new icons for applications to setting the scope of the desktop manager window. On the last point, we are especially critical because Motif desktop managers have been too obvious compared to the unobtrusive Macintosh interface primarily because they have not seamlessly blended in with the background, or root, window.

One of the reasons we like X.desktop 3 best is for its work in solving the root window problem. We're also high on VUE in this regard, but we know, too, that HP had to enhance its version of Motif to blend in VUE. As for Looking Glass, it takes a separatist approach: the desktop manager starts as three distinct windows atop the root window.

Another reason we like X.desktop best is its adherence to open systems standards. Of the three vendors, only IXI used the standard Motif programmer's toolkit to engineer its product. Visix used a proprietary toolkit and HP used its enhanced Motif toolkit. Additionally, at publication time, only IXI had filed certification papers with OSF in order to gain Motif-compliant status for X.desktop. OSF told *UNIX WORLD* that, of the three vendors, only IXI has participated in OSF's certification process since its inception in 1990. Visix, however, has published numerous advertisements using the OSF/Motif logo to claim OSF certification for Looking Glass.

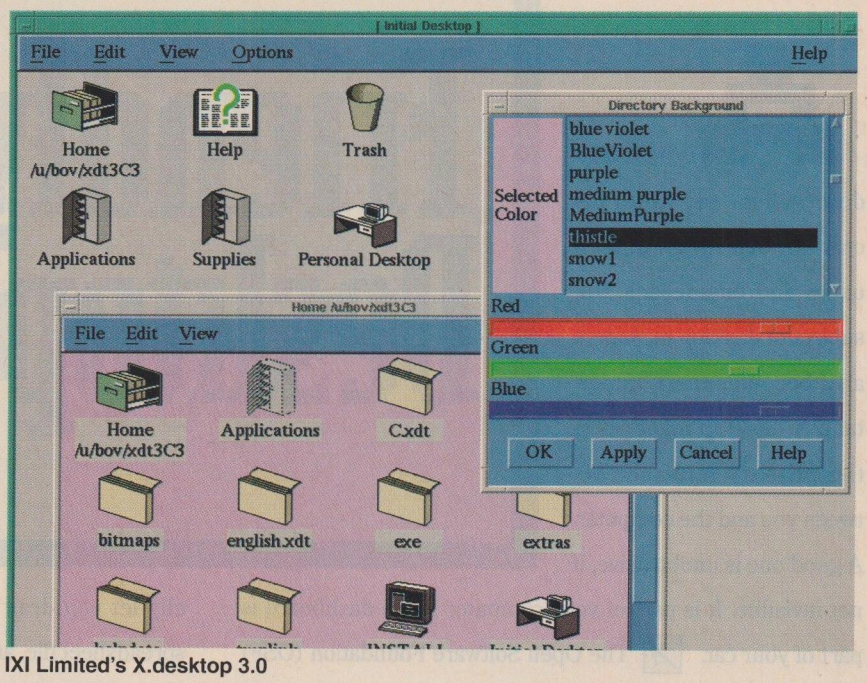
Motif is not the only ballgame for two of the three reviewed products. Looking Glass also runs under SunView, Sun Microsystems' GUI, and OpenWindows. Visix says it is developing Microsoft Windows and OS/2 versions. And IXI is reportedly developing a common desktop for the new Advanced Computing Environment headed by Compaq and Microsoft. This review is concerned with Motif platforms, however, and X.desktop and Looking Glass were evaluated under Motif 1.1, running under X Version 11 Release 4 on a Sun SPARCstation 2. VUE was evaluated on an HP 9000/745 running HP Motif 1.1. VUE is also available for Sun workstations running HP Motif.

X.desktop 3.0

From the moment X.desktop first displays, you know it is a fun product. Its 648 icons (we counted them) use 3-D and animation effects to make an excellent first impression. Functionally, X.desktop is the best Motif desktop manager for many reasons, but the biggest one is it is the easiest to use.

X.desktop has matured in three years. Version 3 has a rich feature set and offers virtual desktops, hypertext help, a tree view directory window, full-color icon editor, and a way to paste data to an icon on the desktop. In version 3, it is also obvious that X.desktop does the best job of coexisting with Motif–compared to VUE, which relies on HP's enhancements to Motif, and Looking Glass, which uses a proprietary toolkit.

X.desktop stresses the single desktop concept. Its main window, from which all other activity occurs, is called the desktop.



IXI Limited's X.desktop 3.0

This immediately distinguishes it from Looking Glass, which uses three main windows. X.desktop's approach, however, is not as refined as that of VUE, which conducts all its activity in the root window. Similarly, VUE offers multiple workspaces that each have their own corresponding root windows. X.desktop's virtual desktops are represented as icons and work under the one root window.

You can set up X.desktop so its main window appears among other windows on the root window or so the main window totally eclipses the root window. We prefer the latter option because it avoids the double reality of Motif and the desktop manager. X.desktop's root window management is not perfect: to retain access to the Motif system menu, you have to click on the left border of the screen. This works, but a better alternative is to modify X.desktop's own pop-up menus, adding the same options available on the Motif menu.

When X.desktop displays, the mix of icons and the options on its pulldown or pop-up menus (you can pick one or the other) is entirely up to you. In essence, the personality of your desk-

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top grows from whatever you happen to place there. Although simple sounding, this is a critical juncture. It is the difference between buying a desk, and buying a desk with a built-in file cabinet.

Single Desktop

The single desktop goes beyond X.desktop's battle with the root window. The other main components of X.desktop, including the file navigator, help system, icon editor, and trash can, are integrated into the main window.

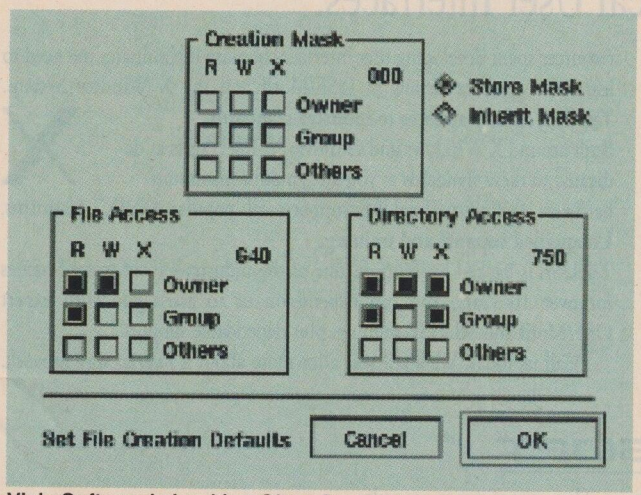
The file navigator is a good example. Instead of running in a separate window, as is the case with Looking Glass, the file navigator can be accessed in one of two ways: from the pull-down menu under the desktop's title bar, or by simply double-clicking on an icon for a directory. When you choose the menu approach you must select the directory to open by clicking on the icon with the mouse.

As with the other reviewed products, X.desktop's file navigator offers a tree diagram to view a file system. To examine a directory's contents, you move across the tree and open another window to display the associated icons. The tree appears in its own window, so you can return to it time and again. And if you have a tendency to open lots of windows, as we do, you can use the second mouse button to ensure that X.desktop brings previously opened windows to the foreground.

The file properties dialog is implemented in a similar manner to Looking Glass, in that users can adjust their ownership and access permissions graphically, rather than learning how to use the UNIX **chown** and **chmod** commands. X.desktop comes with several pre-configured desktops, including ones for novice users, power users, and system administrators. On any given system, you can run multiple virtual desktops and even move icons between different desktops.

X.desktop's help system is sharp. The interface uses a clever book metaphor and features extensive hypertext and context-sensitive features. The help system is also integrated into X.desktop's drag-and-drop protocols, meaning you can drop icons into the help icon, and a window will pop up with the associated help text if help on the subject exists.

You can also expand the help system. For example, you can use the hypertext features to create a company phone book. With IXI's drag-and-drop protocols, you could then drag icons representing users (you can use scanned photographs for the icons) onto the help icon, and whatever information is desired, such as a phone number, complete with hypertext links to personnel information would appear. In essence, the combination of the help system and IXI's command language lets you create mini applications.



Visix Software's Looking Glass Professional

The X.desktop icon editor is the most advanced we've seen bundled with a desktop manager. The icon editor behaves like a drawing program and lets you paint bits based on a palette of colors. If needed, you can create new colors in a separate dialog box. The icon editor also includes an image grabber that lets you take a snapshot of a screen region, bring the bit pattern into the editor, and then modify its shape and color.

Fluid Interface

One thing that stands out about X.desktop is its emphasis on functionality. The whole interface seems to be alive because almost every object is capable of making use of IXI's drag-and-drop protocols. We especially liked the way X.desktop lets you paste data, be it text or graphics, from an application to an icon on the desktop.

For advanced users, X.desktop offers a command language that permits interactive dialog between the command line and the desktop manager. You can use symbolic substitution to indicate how specific files should behave in a given event, or you can define rules–to whatever extent you like–that describe a behavior for the desktop, such as the style of icons it uses.

You can change colors in X.desktop easily and could spend hours just going through combinations of colors for various desktops and desktop objects. You can also specify the fonts for icon labels and window titles. Also available are preference settings for the root window background bitmap pattern. And at the most advanced level, X.desktop allows you to configure most anything, including mouse trigger actions and other drag-and-drop behaviors.

X.desktop is easy to use for novice and experienced users. It comes with complete file typing and command scripting and is the most unobtrusive desktop manager, if you take advantage of its root window management. It also gets high marks for its configurability, as well as its adherence to open systems by working with the standard Motif toolkit.

Looking Glass Professional

With Looking Glass Professional, Visix says it places great emphasis on performance and reliability. We found it performs reliably and were impressed that its code requires only about 600 kilobytes of memory. The problem is that Looking Glass is based on a proprietary toolkit that emulates Motif.

The toolkit issue is important. We found that some of the look and feel of Motif was irregular in Looking Glass. We also found that Looking Glass does not work perfectly with the `.Xdefaults` file, an X Windows configuration file that lets you customize the way Motif works. If you use `.Xdefaults` to change keyboard bindings, Looking Glass doesn't always pick up the instruction. Still, Looking Glass is good software, with a professional appearance and readable documentation.

Looking Glass works similar to X.desktop and VUE, but requires more menu interaction. To print a file, you must select an icon and choose the print option from the file menu in Looking Glass' file navigator. In both X.desktop and VUE, you can drag and drop a file icon on the printer icon. You must also use the menus for deleting files, because Looking Glass has no wastebasket icon–a sad omission, although you can make one yourself by connecting an icon to the UNIX `rm` command.

Looking Glass is the most obtrusive of the three desktop managers. It exists in independent windows, layered on top of

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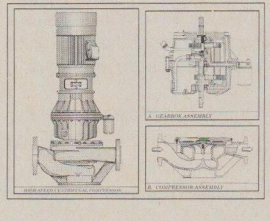

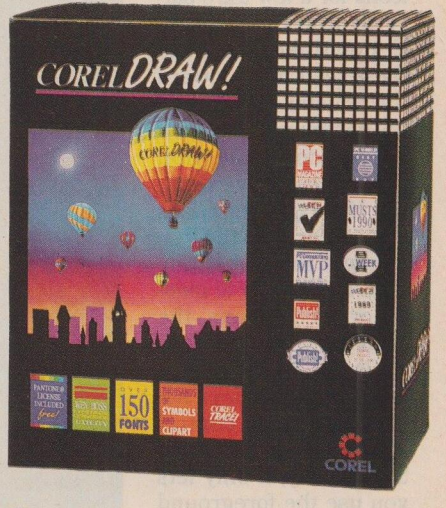

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the root window. Unlike X.desktop and VUE, it does not give you a way of blending the desktop manager and Motif into a single reality. What it does give you is a "global" window, which appears on your screen after you log in. From the Global window, you access other windows by making menu selections. At this second tier of reality, the file navigator and desktop panels windows are most important.

Many users will like Looking Glass' file navigator. It uses a paned window that shows the parent directory in the top pane and the current directory in the lower pane. All of this is done with icons and Looking Glass visually synchronizes the two panes by changing the current directory's icon from an open to a closed file folder. You can also open multiple windows and use the file navigator to create directories, UNIX device files, and special FIFO (first in, first out) files. Unfortunately, while it is mostly complete, the Looking Glass help system doesn't offer much information about why you would create device files or FIFOs.

The desktop panel is the backdrop for Looking Glass' drag-and-drop functionality, as well as the general work area. It can be resized to full-screen, but this technique obscures other windows and Motif icons. Within the desktop panel, you can move icons and launch applications. But the method of getting the icon into the panel is cumbersome. You must first drag the icon in from a file navigator window, and then you must use a menu option called "Put on Desktop Panel." You can also drag icons from other Looking Glass windows and drop them into the desktop panel. To remove an icon from the panel, however, you must resort to a menu option.

Visual Labor

Visix is proud of its Looking Glass icons. Before X.desktop 3, it had the undeniable advantage when it came to aesthetics. For the most part, the more than 550 icons that come with Looking Glass are successful. Some of you may have trouble recognizing icons for a few third-party products, such as FrameMaker, because these tend more toward the artistic rather than the communicative.

The icon collection can be viewed by executing the Looking Glass icon editor from the Run menu in the global window. If you want to modify or create icons, the Looking Glass icon editor is OK. Its major limitation is that it does not give you much control over the color of icons. Specifically, it only lets you use the foreground and background colors to paint icons. X.desktop and VUE offer full-color editors.

Looking Glass' help system is a good one. You press the F1 key in any Looking Glass Professional window, it becomes shaded and the cursor changes to a question mark. You can then move the cursor over any object or menu item in the window and context-sensitive help is presented in a new window that features hypertext links. There is even a history mechanism to aid in preventing the hypertext nightmare of treading over the same ground already covered in a hypertext loop.

Looking Glass supports a file typing language similar to X.desktop and VUE. The Looking Glass file language lets you match icons to files and specify whether a file is executable. By stringing together file commands, you can create icons that initiate shell scripts and pipe data between utilities, but the premise of the file typing language stops here. It is nowhere as extensive as X.desktop's command language and there is no way to specify mouse trigger mechanisms.

Other notable features in Looking Glass are the ability to save desktop layouts, a UNIX environment variable editor, and excellent configurability, including dialog boxes for changing permissions and user preferences.

As for Motif compliancy, our evaluation shows it to be mostly compliant, with the exception of three items required by OSF Level One Certification Checklist. These items involve the consistent use of outline boxes for text entry, tab-key behavior in dialog boxes, and the ordering of the "OK" and "Cancel" buttons in dialog boxes. While these concerns are not major–unless you're a devotee of the tab key–they do speak to the underlying concern we have with Visix's proprietary toolkit.

continued

Review Highlights

	X.desktop 3.0	Looking Glass Professional	Visual User Environment
CONTACT INFO	*IXI Limited* 62-74 Burleigh St. Cambridge CB1 1DJ England +44-223-462131	*Visix Software Inc.* 11440 Commerce Park Dr. Reston, VA 22091 800-832-8668 or 703-758-8230	*Hewlett-Packard* 19130 Pruneridge Ave. Cupertino, CA 95014 800-833-7242 or 408-973-1919
⊕	Good documentation, easy installation. Full color 3-D icons, animated icons, hypertext help, and strong support for drag-and-drop. Supports use of desktop as the root window.	Good documentation. Displays shell commands. Includes environment variable editor, hypertext help system with history feature, extensive file typing, and drag-and-drop protocol.	Excellent documentation. Multiple session desktopsl. Artistic background bitmaps. Strong support for drag-and-drop protocol.
⊖	Installs files and directories directly into X11 hierarchies (should use symbolic links instead).	Hypertext help could use improvement. Requires knowledge of some UNIX commands. Installation is laborious.	Must use HP Motif on Sun systems to run VUE. Help system needs improvement. Mostly unimpressive icons.
VERSION	3.0	2.1	1.0
SYSTEMS	Sun-3 and -4, IBM, HP, DEC, SCO, and most all other UNIX/X11 environments.	Sun-3 and -4, Apollo, IBM, DEC, SCO, and other UNIX X11 environments, plus SunView and OpenWindows on Sun workstations.	HP and Sun SPARCstations.
LICENSING	Single or multiuser–no license manager.	Single user–flexible license manager.	Per user ($395 for X terminal per user).
PRICE	$795.	$795 for diskettes or tape.	Bundled with HP workstations and X terminals. Sun product is $550.
SUPPORT	Toll free support in the United States.	Annual support is $120, includes maintenance upgrades and toll-free telephone or e-mail support.	By contract, 5 a.m. to 2 p.m. EST, Monday through Friday. Sun version supported by SAIC.

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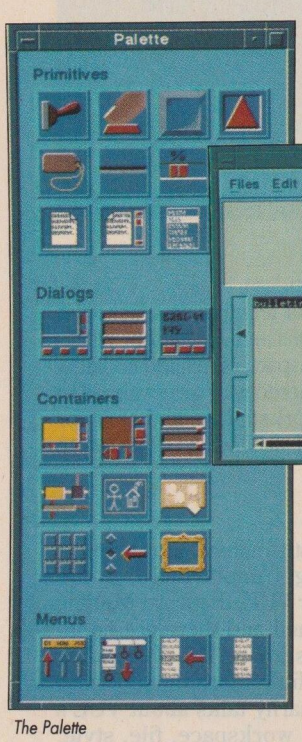
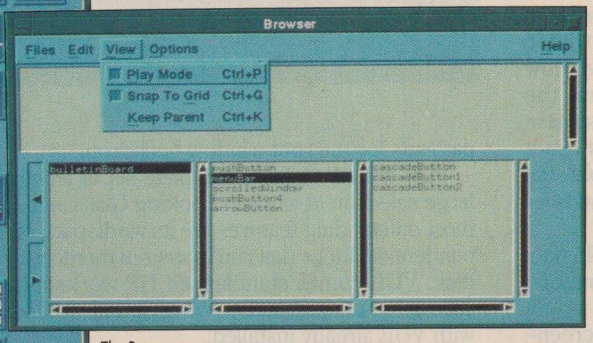
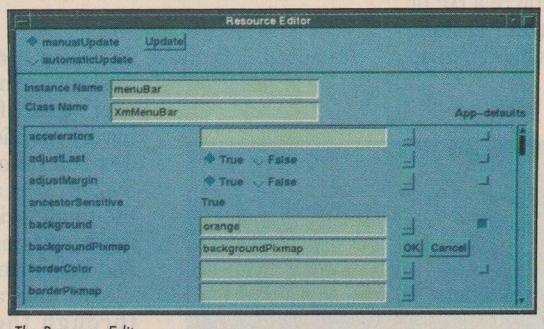


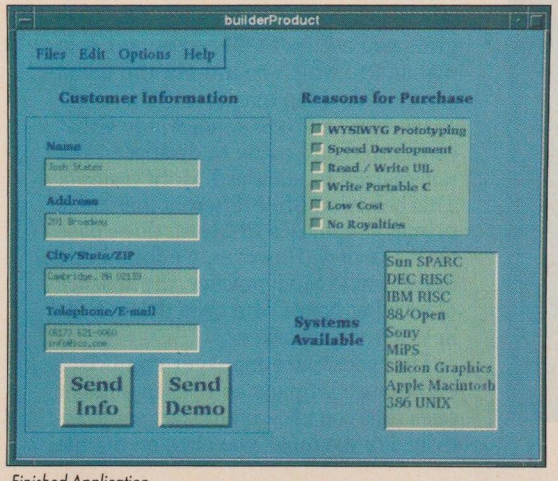
The Palette



The Browser



The Resource Editor



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Lastly, Looking Glass is no breeze to install: its license manager and long activation keys are required to activate the license server. Aside from this, the script-driven installation procedure worked fine. The user's manual also documents the process well, as it does for most aspects of the product.

When all is said and done, Looking Glass is a good product. Visix's technical support is first class, with regular phone support as well as off-hours e-mail reporting. It is quite obvious that a great deal of attention to detail has gone into Looking Glass. Again, our concern is the proprietary toolkit–which, says to us, "Buyer beware," because as Motif evolves, Looking Glass might not evolve the same way.

Visual User Environment

Visual User Environment is a work of art with a flaw. In both scope and premise, it rivals X.desktop and surpasses Looking Glass. And most of the drag-and-drop functions and advanced configurability of X.desktop are in VUE. The only problem with VUE is it grows from HP's enhancements to Motif, which seem awfully proprietary.

True, you can get VUE for Sun workstations, but in order to do so, you must accept the ported version of HP's Motif with it. In this version of Motif, you no longer use the **mwm** window manager and its associated configuration files, but use the **vuewm** window manager and its files. Short of a lot of system administration headaches in making the change, the net result gives you a better implementation of Motif. But the whole subject is bothersome to us–HP, after all, was the OSF member that drove the development of OSF/Motif.

Politics aside, the world according to VUE is a simple one. Computer users should be working on large screen monitors, so VUE can exploit every square inch. The only thing wrong with this approach is it would be leviathan on a smaller screen–if HP were to port it to SCO, for instance. But if you're a HP or Sun user, you'll find VUE an experience in computer aesthetics, especially as you browse through the well-designed bitmap patterns for the root window backdrop.

Desktop Features Compared

Feature	Looking Glass	X.desktop	HP VUE
Supports Motif on Sun	Yes	Yes	Yes
Supports Motif 1.1(X11.4)	Yes	Yes	Yes
Sun Open Windows Version	Yes	No	No
Identifies files by extension	Yes	Yes	Yes
Supports virtual desktops	Yes	Yes	Yes
Takes over root window	No	Yes	Yes
Number of packaged icons	550	600	200
User-definable menus	Yes	Yes	Yes
Drops icons into running app	Yes	Yes	No
Window panes in file navigator	Yes	No	No
Pre-configured user environment	No	Yes	Yes
Multi-colored, 3-D icons	No	Yes	No
Full-color icon editor	No	Yes	No
Integrated control panel	Yes	Yes	Yes
Context sensitive help	Yes	Yes	Yes
Includes root backgrounds	No	Yes	Yes

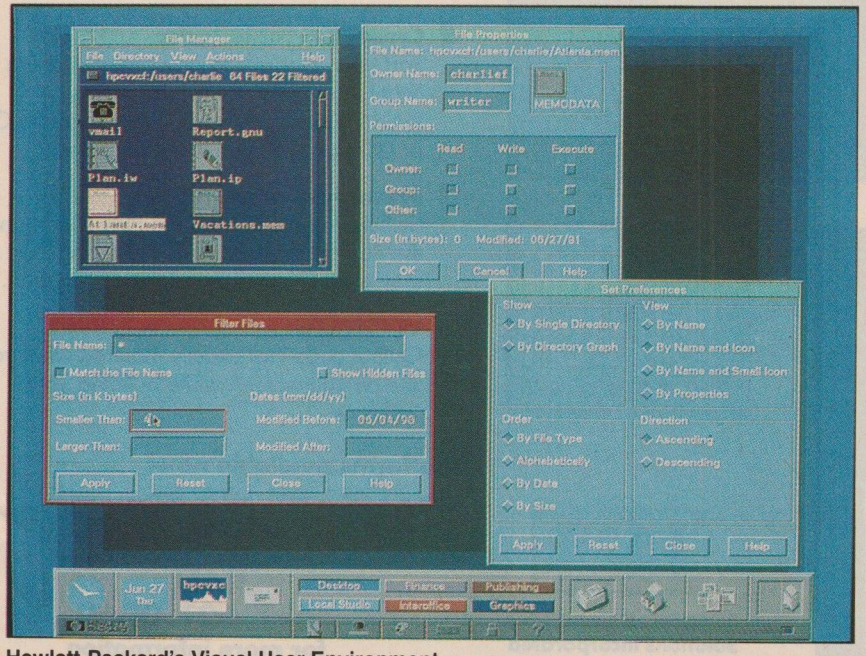
VUE delivers a fairly complete set of features, but lacks the large selection of icons in Looking Glass and X.desktop. VUE's most outstanding features are its workspace panel and six independent desktops that run in system memory or are swapped to disk. VUE comes standard on HP workstations and sells for $550 in its Sun incarnation. We reviewed VUE on an HP 9000/745 with VUE already installed.

Working Space

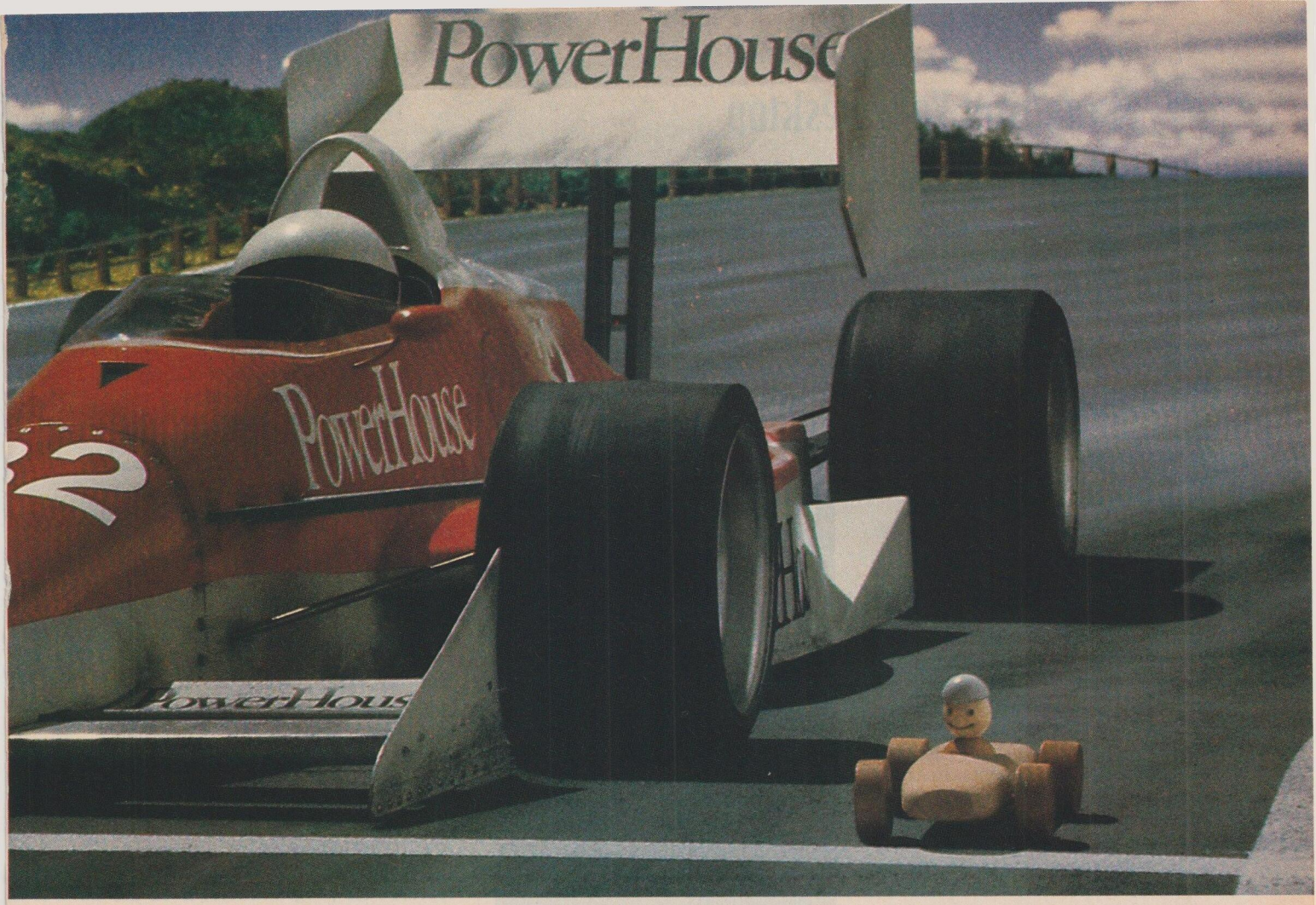
As noted, HP chose to obscure Motif instead of making it desktop manager unobtrusive. In the user's guide for VUE, the word Motif is hardly mentioned and there are no index references for it. The X Window System gets a little more mention, but the guide primarily talks about VUE's login, session, workspace, file, style, and help managers.

You interact with VUE primarily through the workspace manager. Dubbed the "the chief of staff" in the user's guide, the workspace manager gives you access to file, style, and help managers, which round out the usual scope of desktop managers. The workspace manager is a panel window that can moved and made to disappear, but not resized in standard Motif fashion. This behavior, while different than most primary windows in Motif, does pass OSF's review. However, we found one questionable Motif practice, the absence of warning boxes when you delete a file in VUE's wastebasket.

The workspace manager comprises eight large bitmaps and seven smaller ones that you click on to start some activity. For example, you click on the file



Hewlett-Packard's Visual User Environment



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cabinet bitmap to start the file navigator. After using the navigator for awhile, you can close it or minimize it, whereupon it becomes an icon on the background window. The next time you go to use the navigator, however, you either remember you have an iconified version running, or click again on the workspace file cabinet bitmap.

Until you become a whiz at remembering what you've iconified, the duality involved is likely to cause you to have multiple active copies of the navigator. VUE handles other utilities the same way, including `xterm`. While you can be a purist and make the same argument about the menu-based approach of starting utilities in X.desktop and Looking Glass, neither of these have workspace bitmaps to seduce your mouse.

The workspace manager also provides access to VUE's six virtual desktops. Unlike X.desktop's virtual desktop views, VUE kicks in with a completely new desktop each time you click one of six buttons, which you can name whatever you want. Credit for this feature should go not to VUE, but to HP's enhanced Motif. The benefit to the user–and it is a big benefit that OSF should consider adopting–is that you can have multiple work environments. Imagine spreadsheets on one desktop, word processors on another, and on yet another, you're favorite picture of Vanna White (who gets around quite a bit on the bitmap circuit).

Not So Much Control

VUE has most of the traditional desktop manager features, such as a wastebasket bitmap in which to dispose of unwanted files, and a printer bitmap to initiate a print session. These are found on the workspace, which means you can't dynamically move them to your favorite parking spot on the screen as you can with icons (but you can make others). Two thoughtful extras on the workspace panel are bitmaps of a clock and date display. But you have to balance these against thoughtlessness, because you must go to the UNIX command line to change the date and time.

As for the style manager, it gives you plenty of activities to regulate, but sometimes not so much control. The style manager itself is a Motif window with a minimize button, but there is no way to resize it. Inside the window there are eight bitmaps, any of which you can click on to begin an activity. The niftiest activity is changing the desktop's root window screen, which you accomplish by selecting a color and design from a listbox. Other items on the style manager include fonts, mouse button configuration, and host access, which lets you tune other workstations on the network in or out.

A sadly disappointing aspect to the style manager is its color selection listbox. Instead of giving you control over different parts of a window–title bar, frame, work area–the color selection is limited to contrasting colors for windows and the desktop background. On the plus side, the color listbox leads to a dialog box in which you can create customized palettes via simple slider bars. Using this dialog box, you can also grab a color from any part of the screen and apply it.

To maximize your desktop environment, VUE gives you full access to X and Motif configuration files. Unfortunately, the Motif files have been renamed in VUE, so the experienced user will have to relearn a few filenames and paths. VUE also gives system administrator-types extensive control over mouse button and keyboard bindings, as well as the fixed positioning and contents of the workspace manager. And as with X.desktop, VUE lets you specify actions associated with file types and their respective icons.

VUE provides users with a solid desktop management environment, but lacks some subtleties because it is new product. As for its future in an open systems environment, we will wonder.

Desktop Wrapper

Before our evaluation, we realized that the desktop manager is a strange phenomenon. It is neither system-level software nor a traditional application. The closest thing UNIX had to desktop managers before this emergence was ASCII shell interfaces.

A desktop manager need not provide features for programmers. Even the most technical user can benefit by viewing the desktop in an object-oriented manner. By remembering the location of files, directories, and file systems in terms of spatial relations, the human brain can store more information. By recognizing files by an icon's color and shape–we'd love to see someone come up with an cobweb icon for old files–the brain reacts more quickly. The word for this is encapsulation and it works for humans as well as computers.

In this regard, all three reviewed products represent some of the best development work ever done in the UNIX environment. Of the three, Looking Glass needs more work in developing mouse and icon actions. VUE is on target and gets much praise, even if its praise is crossed with bewilderment at HP's enhanced Motif. And X.desktop gets the most praise–for advancing the state of the desktop manager, for being unobtrusive, and for being easy to use. ■

A Desktop Manager's Glossary

Animation When an icon moves or otherwise appears "alive."

Control panel A dialog box or other window that lets you set system preferences such as screen color and mouse buttons.

Dialog box A special Motif window that lets you enter text and choose options with buttons and sliders, among other controls.

Double clicking Click the same mouse button twice in quick succession.

Drag-and-drop You *drag* an icon with the mouse and you *drop* an icon onto another icon to begin some process.

File typing A script mechanism that tells the desktop manager what type of icon should be used to represent any given file.

Main window The first window that appears in an application; or the window at the top of a hierarchy of windows in an application.

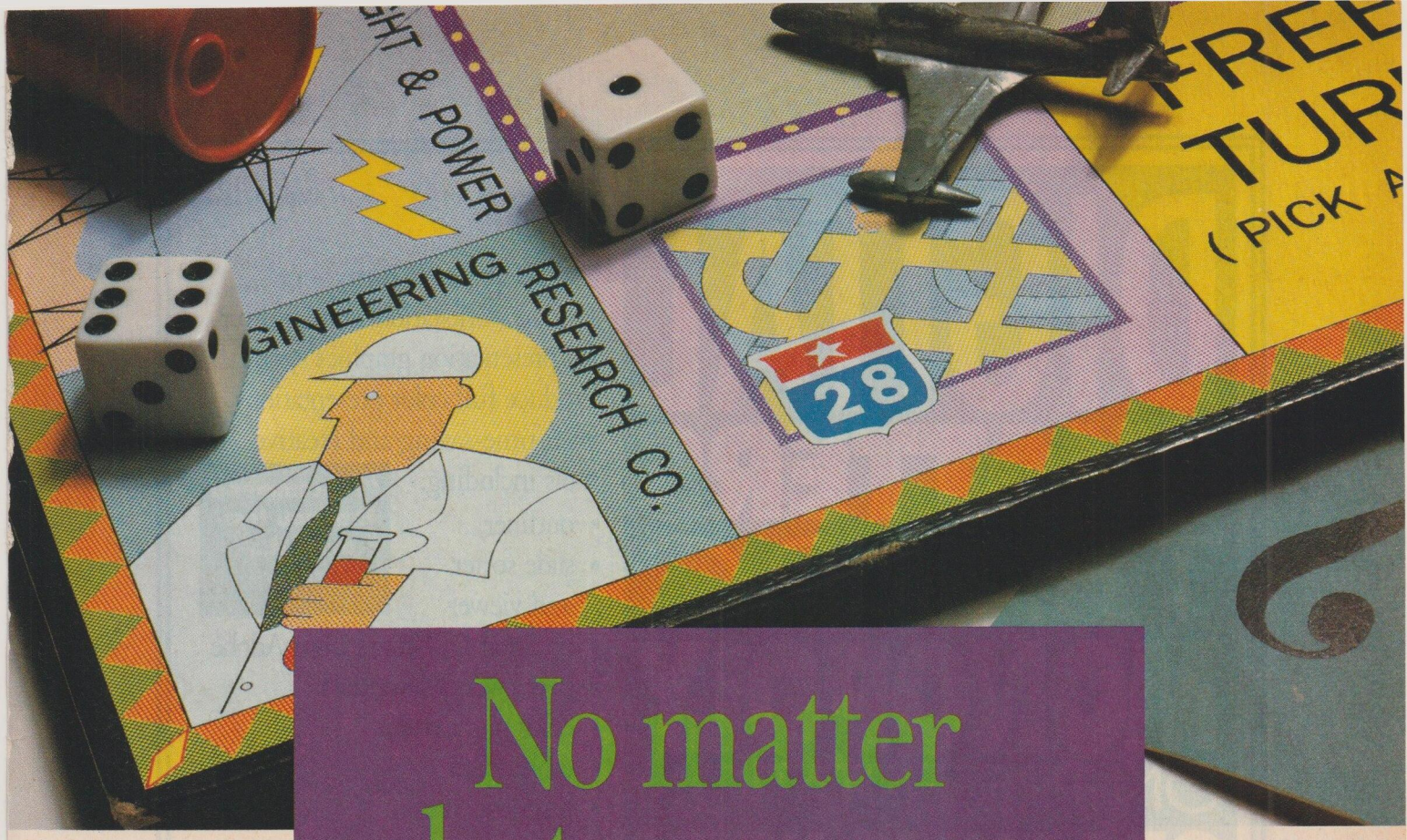
Minimize Reduction of a running application to an icon; the code for the application remains in memory or is swapped.

Root window The background window that appears when you start the X Window System. Motif takes over the root window after it is started.

Style guide Instructions to programmers on the appearance and behavior of a particular graphical user interface.

Title bar A strip at the top of a window where an application's name appears.

Steven Mikes is a published author of UNIX and X Window programming books, and lecturer on X/Motif/Open Look programming, including GUI builders. He can be reached by e-mail at: `uunet!topgun!smikes`. *Product Reviews Editor Alan Southerton has published three books on programming GUIs and is currently working on* Modern UNIX *(to be published by John Wiley), which describes UNIX from a GUI point of view.*



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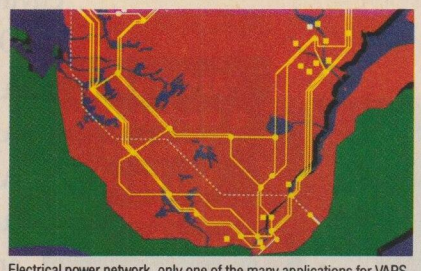

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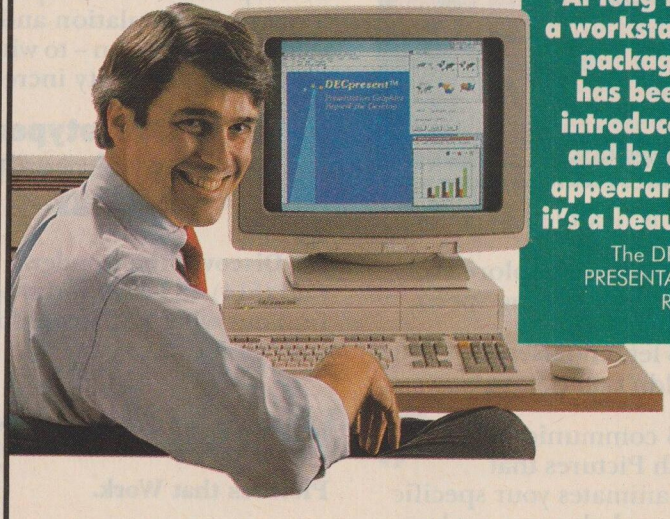

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WILLIAM CONE

THE *MELLOWING* OF NEXT

Evangelist Steve Jobs loosens the reins and makes Next more market-driven. Did he wait too long?

By Gary Andrew Poole

STEVEN P. JOBS, PRESIDENT OF NEXT Inc., is an evangelist for his company, but he's not regarded as much of a business success. Since its inception six years ago, Next has sold only 15,000 workstations while competitor Sun Microsystems sells nearly 200,000 units annually.

Despite Jobs' slow start, he has always garnered gobs of attention. His charisma has made Next seem like a company on the verge of a breakthrough instead of a company on the verge of financial breakdown. In October 1988, when he publicly announced the first Next system, Jobs was on the cover of *Newsweek* with the headline: "Steve Jobs Puts the 'Wow' Back in Computers." Two years later, Next was having serious financial problems. Despite these difficulties, when Jobs strolled onto the stage of San Francisco's Davies Symphony Hall to introduce the Nextstation in October 1990 he was greeted by thunderous applause.

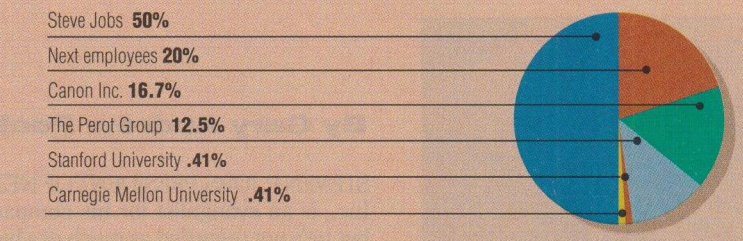
The press and analysts are mesmerized by Jobs, but buyers haven't been mesmerized by his machines. Jobs' marketing and sales strategies have stalled sales. After dismal financial quarters, the company has initiated programs to turn its downward course around, according sources familiar with the company. How does Jobs answer these charges? He refused to speak with us, based on his policy of not speaking to the trade press.

But there is a subtle change at Next. Most of its new policies have come from Jobs' inner sanctum of managers, not Jobs himself. A notoriously poor manager, he has delegated a lot of control to his senior subordinates. These officials have to compensate for Jobs' previous poor decisions and are approaching the market more pragmatically, say analysts.

The original Next machine had numerous problems. The machine had a slow optical drive, a beta version of the operating system, a hard disk as an option, and no floppy drives. It was perceived as a machine that didn't meet industry standards and made Next a lone wolf in the UNIX computing marketplace.

Next has taken small steps toward turning itself around this year. But the company has gained negligible market share and it aches for profitability. Strategies implemented by Jobs continue to haunt Next. Some analysts speculate Next will never be more than a company for hobbyists and students. "I'm not persuaded that Next will ever come near Steve's dream," says Dick Shaffer, editor of the *Technologic Computer Letter,* referring to

Next Ownership



SOURCE: Next

Jobs' ambitions to make Next a dominant player in the workstation market.

If the marketplace continues to ignore Next, the company will be in serious trouble. Next officials and some analysts say the company is moving in a positive direction, however. Much of this change comes from Jobs' loosening of the reins, say insiders. "Steve has really begun to listen to the marketplace," says Todd Rulon-Miller, Next's vice president of U.S. sales. Next claims it shipped 8,000 workstations in the spring quarter, but many of those shipments were actually upgrade boards sold to existing users, say analysts. International Data Corp. (IDC), a market research firm, says Next actually shipped only 4,000 machines.

"I love the Next box," says an anonymous Next user, "but Next is in the same category as Atari and Amiga. It has users bordering on the fanatical, but there's a lack of impact on the overall marketplace."

What's Next Doing Right?

Next is straining to find a niche in the workstation market. In its new products, Next has made technologic innovations without accompanying connectivity tools and software. The Nextstation, with a 25-MHz 68040 processor, has a list price of $4,995 ($7,995 with a 17-inch color monitor). It is less expensive than workstations from IBM and Sun, but only has about 200 shipping applications. There's no compelling reason to buy a Next machine unless the user wants to write applications with NextStep, say analysts.

"If someone is building applications in-house, it's a very effective machine," says Paul Cubbage, an analyst at Dataquest who uses a Next workstation.

NextStep is Next's much-lauded graphical user interface that makes UNIX easier to use. NextStep lets users move files around and run application programs that make the machine useful. An object-oriented development environment, NextStep simplifies and speeds up the construction of powerful, easier-to-use software.

"NextStep gives us incredibly fast development time," says Eric Spahr, a vice president at Lehman Brothers, a securities firm with seven Next machines. "If we had Sun boxes we would need a full-time technical person." Spahr says his group writes custom applications.

"Object-oriented programming is the way of the future," says Dataquest's Cubbage. "Next is the only machine designed from the ground-up for object-oriented applications."

Next buyers interviewed say NextStep was their primary reason for buying the machine. Educators and students like NextStep because it's good for teaching and learning software development. Next will make inroads into the corporate market as well, predict analysts. Vicki Brown, an analyst with IDC, predicts Next will ship 36,000 to 44,000 units in 1991 to non-technical organizations using NextStep to move custom, in-house applications off IBM mainframes to client-server environments. (To date, however, Next's largest customer, The William Morris agency, has purchased only 250 machines.)

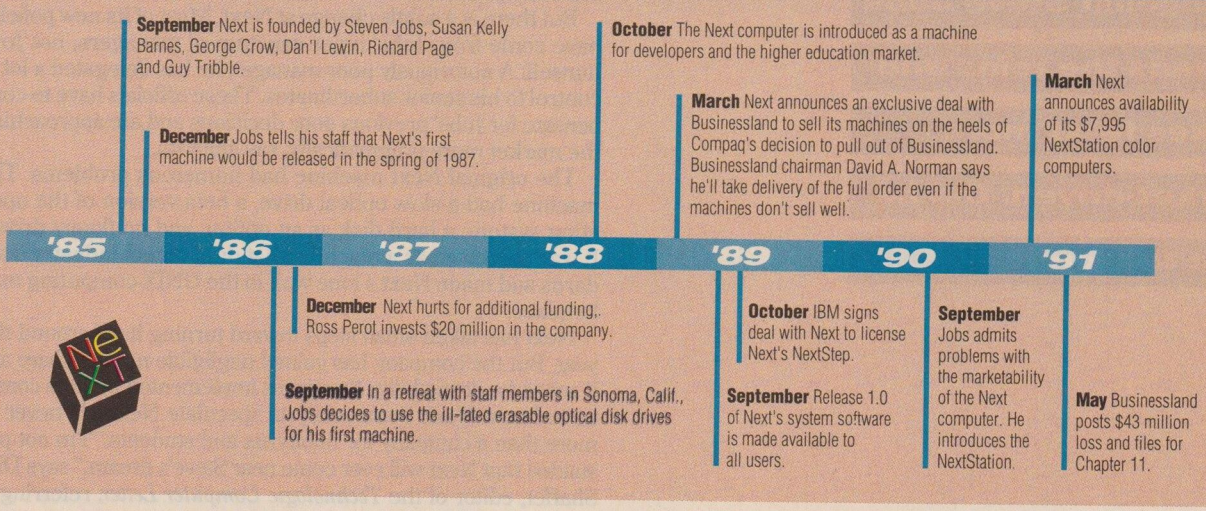
"Many of our dealers think of this as a Mac III," claims an official at Next. "We can do all the things a Sun can do and we have this great interface."

The Next Step with NextStep

Although NextStep is a celebrated environment, Next has yet to garner popular acceptance in *Fortune 500* environments. It has had one victory: IBM has licensed NextStep for potential use on its computers running AIX, but Next hasn't seen any money from the deal. William Filip, president of IBM's Advanced Workstation Division, says the two companies are still negotiating the specifics of the deal.

Many of Next's problems come from a lack of software, but that's changing as

The Development of Next



"I can't believe it's not UNIX."

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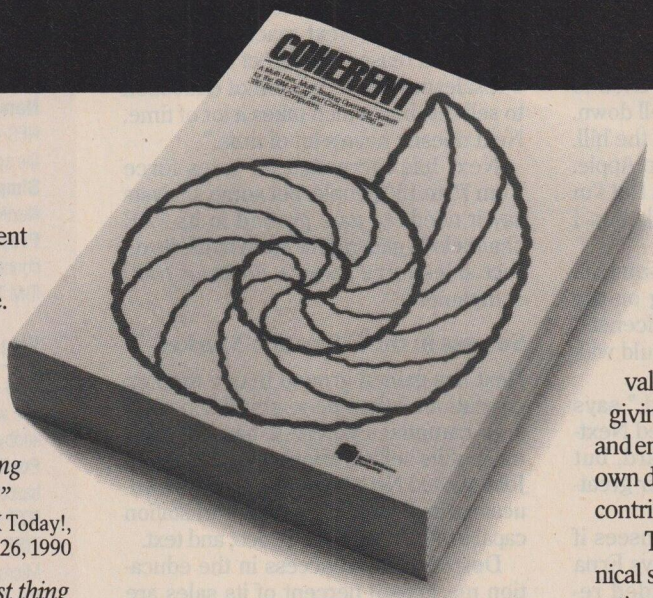

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FrameMaker, Top Draw, Adobe Illustrator, and Wingz move to Next. Insignia Solutions Soft PC can run on Next's new built-in floppy drive, which reads and writes PC-formatted 3 1/2-inch floppy disks, giving a degree of DOS compatibility to the machine.

"There's a valley you have to cross," says Jonathan Seybold, president of Seybold Seminars. "Next hoped to get across the valley quickly. They tried to build a bridge, but that bridge fell down. Now it's climbing up the side of the hill. I don't think Next will be the next Apple. It's not going to streak past Sun. But I'm less worried [about its future] then I was last year."

A few analysts say Next is missing an opportunity by not capitalizing on the breadth of NextStep. If Next licensed NextStep to other vendors, it could widen its market, they speculate.

"They're extremely paranoid," says one Next watcher. "If they ported NextStep it would become a standard, but they're afraid of giving away their greatest asset."

"We're open to potential licensees if the right one comes around," says Erna Arnesen, director of value-added reseller (VAR) and original equipment manufacturer sales at Next, but she adds that there are no immediate plans to license NextStep.

Distribution Obstacles

If NextStep is Next's crown jewel, its distribution strategy has been its fools' gold. It formed a relationship with the computer retail chain, Businessland, but that went sour because the Businessland salespeople reportedly didn't understand how to sell UNIX machines.

"One of the biggest mistakes Next made was the Businessland deal," says Seybold. "At the time it was a great idea, but Businessland couldn't deliver." He says retail stores aren't good support channels because users buy UNIX workstations primarily for applications development.

"We're going after dealers that are technically competent," Pryce Harrison, Next's manager of reseller programs says about Next's new distribution philosophy. He says BusinessLand was a good choice for Next because it wanted national distribution with a minimum number of partners. Businessland had its troubles selling UNIX, but he doesn't blame it entirely for the failure of Next's sales. "We didn't give them a product to sell," he admits. He says Next is currently targeting smaller dealers in large metropolitan areas.

Next has adopted another strategy to refocus its distribution channels. Next is concentrating on a Sun-like VAR strategy in which it develops VARs in vertical markets like medical applications.

"They're doing a terrible job selling the machine," says Paul Murphy, a member of Gotham Users of Next (GUN), a New York Next user group. He says VARs have come to him looking for ways to sell Next machines. "They need to increase their direct sales force, but salespeople need a ton of education to sell this box which takes a lot of time. Next doesn't have a lot of time."

Next has increased its sales force from 75 to 150 people, but some analysts say it needs to gain ground in its VAR channels to gain momentum while its direct sales force targets *Fortune 1000* companies.

Success in the Education Market

Next has gained ground in one market: education. It has been popular on college campuses where it has targeted most of its selling efforts to date. When Jobs started Next he wanted to supply educators and students with a workstation capable of mixing audio, video, and text.

Despite Next's success in the education market–40 percent of its sales are credited to this market–the market has limited value to Next's bottom-line because it heavily discounts the boxes it sells to students.

There are other problems. Hardware giants IBM, Sun, Hewlett-Packard, and Digital Equipment Corp. are continually introducing new, fast machines, while the medium-sized Next struggles to compete.

"Every time I turn around there's a new workstation being released from Sun, HP, DEC...," says Cubbage of Dataquest. "That's a fierce rat race to get into. Are they going to be able to keep up? Next has to get a stranglehold on some vertical markets or it won't."

What's Next?

Next must sell its machines through its retail and newly developed VAR channels to achieve long-term success. Its direct sales force must aggressively target large corporations for large bids. Next needs flexibility in its sales structure: Jobs has reportedly lost some major bids because he refused to give large buyers demonstration units.

But people close to Jobs says he has mellowed. "Steve has always created a challenge to internal and external people," says one person who has worked closely with Jobs, "but he's starting to give the people around him more power. His senior people are starting to manage him."

Next must continue its technical innovations or it will be left behind by Sun, IBM, DEC, and HP. Its long-awaited next machine, the Nextdimension color workstation, couples a 68040 processor with an i860 RISC processor to manipulate graphics much faster than a high-end Macintosh or PC. It gives Next some added life and should help it stay ahead of the technology curve.

"In the next year or so they have to make all the right decisions," says Dataquest's Cubbage. "They have to avoid the Robert E. Lee syndrome." Meaning, Next can't afford to make a lot of correct decisions and then have a Gettysburg-like failure. Next has made many mistakes in the past, but is making inroads into the commercial workstation market. Next won't be a large Sun-like company, but it can carve a substantial niche if it follows through on technical and sales channel promises. ■

Standards Met by the Nextstation

Connectivity

Ethernet IEEE 802.3a protocol
TCP/IP UNIX version BSD 4.3 networking interface
Network Architectures Supports Sun's NFS 4.0 and Transarc's AFS 2.0 distributed file system
Simple Mail Transfer Protocol (SMTP) NextMail is built on it
Proprietary Protocols Next systems connect with Novell NetWare, AppleTalk, and IBM Token Ring networks.

File Formats

DOS and Macintosh File Systems Reads and writes DOS-formatted diskettes of 720 kilobytes, and 1.4 and 2.88 megabytes
PostScript Language Adobe PostScript-based display and printing
RTF Microsoft's Rich Text Format
TIFF Stores, displays, and prints Aldus and Microsoft Tagged Image File Format images
CD-ROM International standards organization ISO 9660 and High Sierra formats

Development Environment

ANSI-C and Objective-C Objective-C and C++ language support are bundled.

User Interface

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CIRCLE NO. 158 ON INQUIRY CARD

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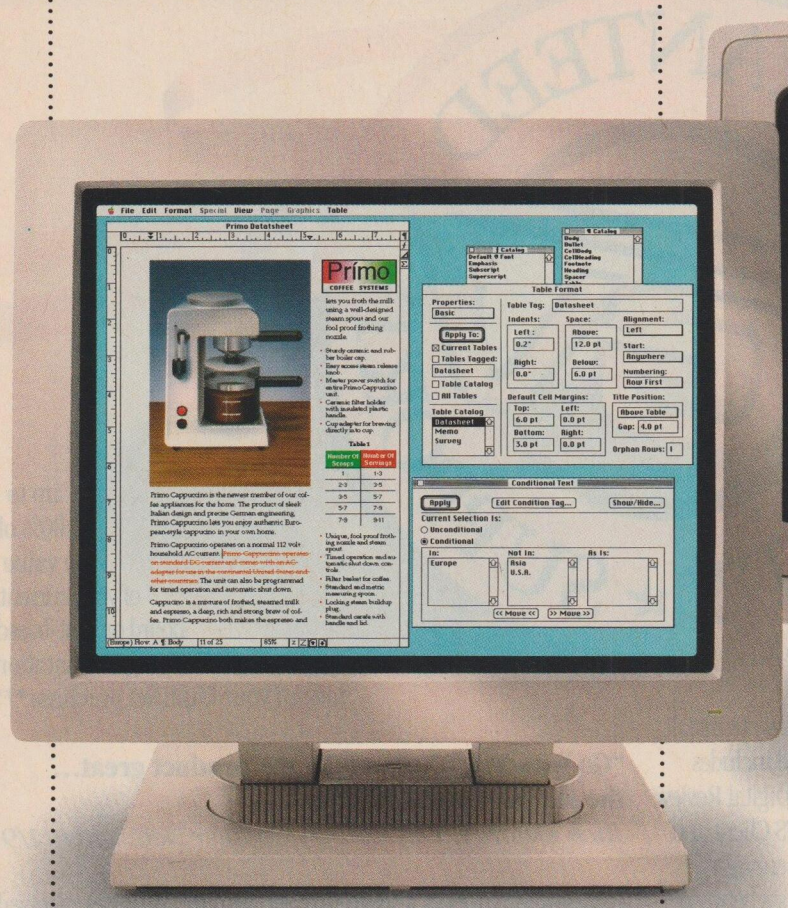

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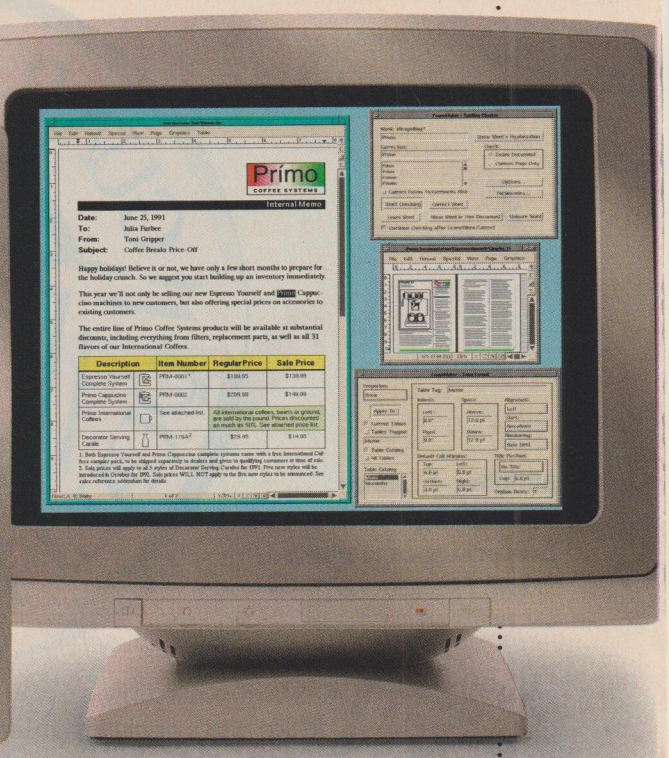

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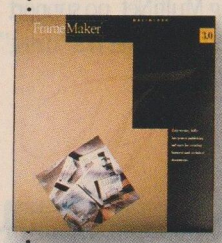

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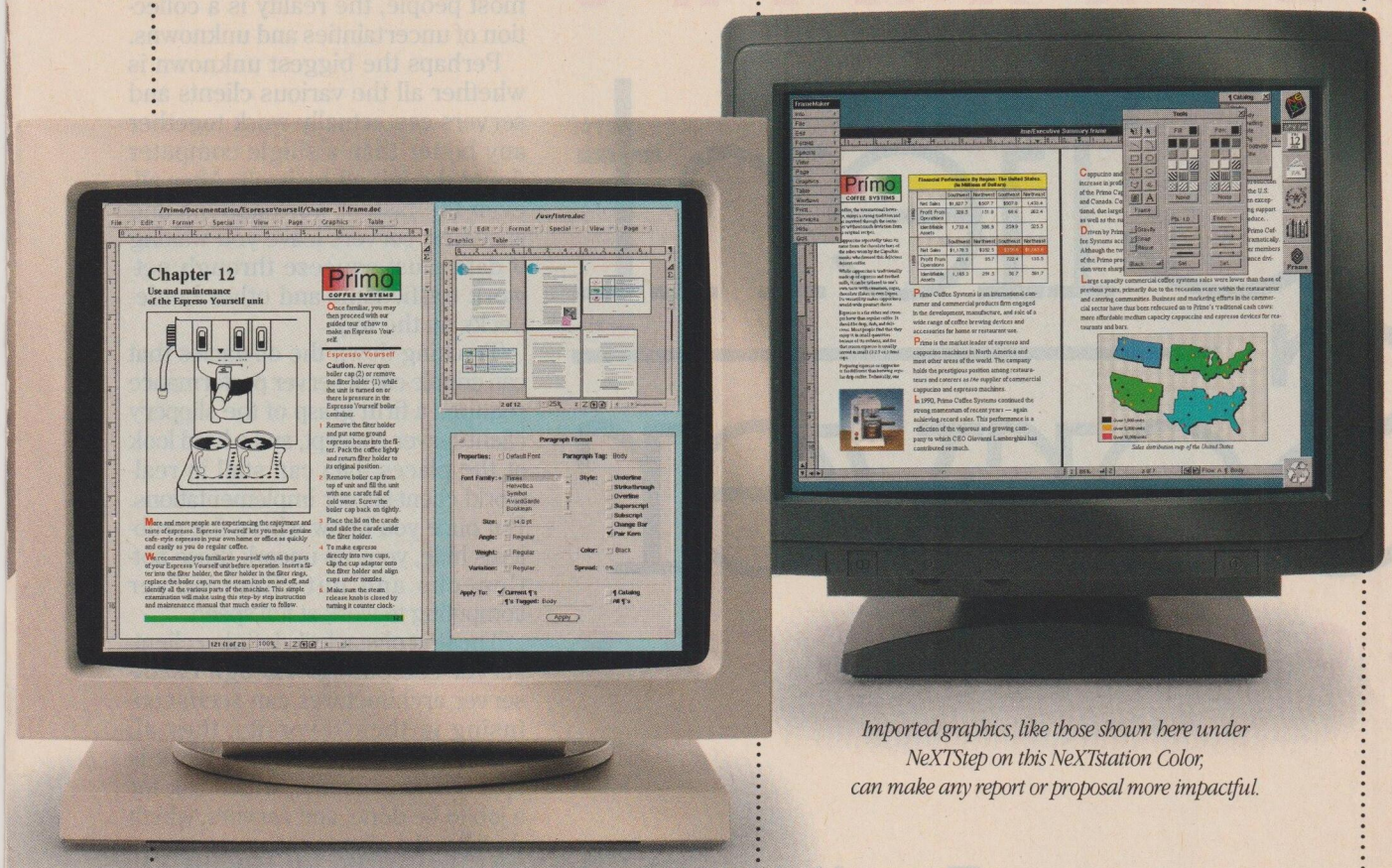

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UNJAMMING Client-Server BOTTLENECKS

For clients and servers to work efficiently, you have to know where the system slows down and how to fix it

by Frank Hayes

Let's face it: client-server computing has problems. The idea of spreading an application across a computer network by splitting it into "clients" and "servers" sounds like a great way to get the most out of computers. Unfortunately, for most people, the reality is a collection of uncertainties and unknowns.

Perhaps the biggest unknown is whether all the various clients and servers can actually work together any better than a single computer doing the job all by itself. After all, even the fastest workstations and speediest servers leave you waiting if data must squeeze through network traffic jams and other bottlenecks on the way.

Tracking down the obstacles that can cripple client-server performance requires a firm grasp of the slippery client-server concept, and a hard look at the places data can stall in real-world client-server implementations. But once you know where the problems hide, you can uncork those bottlenecks and put client-server computing to work at full speed.

The first obstacle is defining client-server computing. Though client-server architectures can seem confusing in their diversity, they all share a single philosophy. Work is split between clients, which ask for a job to be done, and servers, which do what the clients ask.

In a conventional application, a single program or process does all the work. In a conventional database application, a single program accepts each user's request for data, searches the database for the requested data, sorts the data, and displays it for the user.

In a client-server application there are two independent processes rather than a single integrated process. Using the database example, the *client* process accepts requests for data and displays it, while the *server* process searches the database and sorts the data. The client asks for the data, and the server provides it.

Why break the application into two pieces? The most compelling reason is that it can spread the computing work across several computers or workstations on a network. The client and server processes

communicate through a well-defined message protocol, but are completely independent. As a result, the client and server can be on different computers, communicating across the network. With this modular structure, you can connect specialized computing resources, such as database servers, file servers, and graphical workstations. Each type of computer does what it does best.

In theory, at least, this gets the best performance possible from each of your different client-server applications. That should also mean peak performance from the system as a whole.

Three Kinds of Client-Server

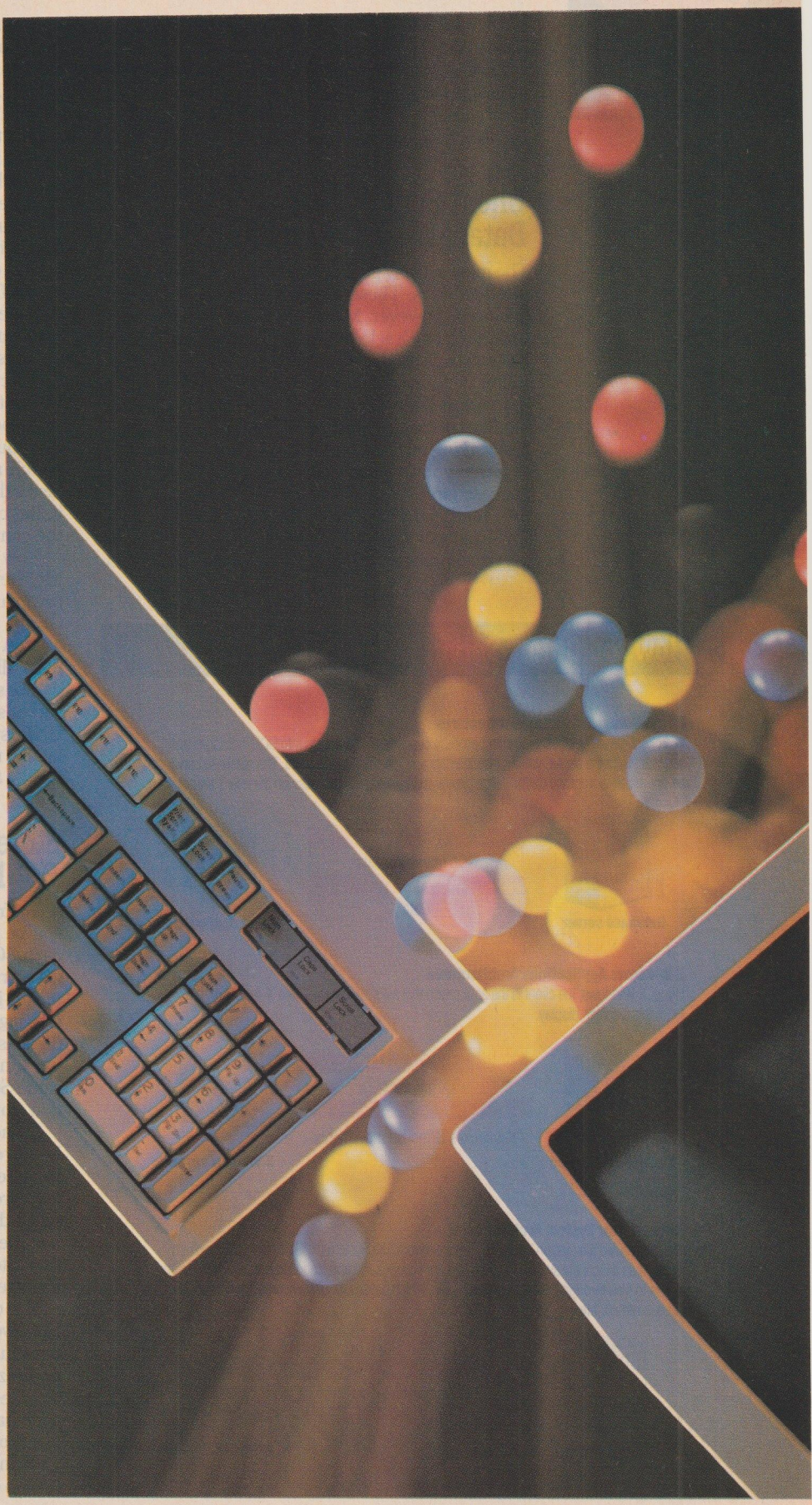
In practice, exactly how a client-server system performs depends on exactly what *kind* of client-server architecture is being used. The three most common categories of client-server architectures are SQL-based databases, X Windows-based graphical displays, and NFS-based (Network File System) distributed file systems. Each shares the client-server philosophy in which a client process asks a server process to do something, and the server complies.

In an SQL-based database architecture, a process on the client UNIX workstation or DOS-based PC, converts the user's data requests into SQL messages. It then sends the messages across the network to the database server, which finds the appropriate data and returns it to the client.

Under X Windows, an application program is the client. It requests that the X terminal, the server, display images and send the user's keystrokes or mouse movements back to the client application.

In an NFS file system, the client, an application or user, requests that a remote file system, the server, send it part of the contents of a file.

In each case, the requests between client and server are sent as messages. Databases use the message language of SQL to pass queries and data from one side to the other. With X Windows, on-screen graphical displays, keystrokes, and mouse movements are exchanged as X packets. Under NFS, sections



MIKE CARR

of files can be requested through remote procedure calls.

Although all three architectures share the same philosophy and a similar structure, the differences are crucial to finding the performance trade-offs for each kind of client-server application.

Client-Server Database Performance

The most actively pursued client-server applications are databases. These are also the least-frequently achieved, however. Major relational database vendors such as Oracle, Informix, Ingres, and Sybase sell database products that use SQL queries to communicate. Corporate users agree that this method is the way to go. According to a recent Sierra Group study, 64 percent of Fortune 500 companies surveyed are working on client-server database applications.

If everyone's interested, why aren't there more success stories? David Wyrstiuk, a project leader for Northern Telecom in Toronto, Ontario, has first-hand experience. To find out how useful a client-server approach would be for Northern Telecom's corporate databases, Wyrstiuk tested a UNIX-based Sequent computer first as a conventional database system with users on terminals connected to the system. Then he tested it purely as a database server with applications running on other processors connected to the Sequent through a network.

The results were surprising. "We thought the network would have been the bottleneck," he says, "but we never topped off the network." The bottleneck came in the database server itself, which had to receive each SQL query, decode it, and then perform a database search or update. The extra overhead of receiving and decoding SQL queries meant the client-server version never ran as fast as the conventional approach.

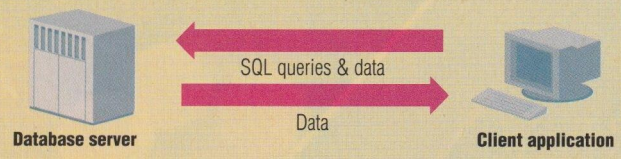
Wyrstiuk still believes client-server computing has a critical advantage. "If you run applications and data on one box, eventually you'll run out of horsepower" as the number of users increases. Wyrstiuk says he didn't reach this point in his tests, which never went beyond 48 users. Still, he believes that once the single machine reaches its limit, the client-server approach will begin to surpass the conventional version.

How can you reduce the bottleneck? Shawn McPherron, Open/OLTP and data management program manager for Unisys' UNIX Systems Group, suggests the solution is a transaction manager. A transaction manager is a software system that collects clients' SQL queries, feeds them to the database server efficiently, then distributes the server's responses. McPherron says a large Unisys UNIX system topped out at 200 users. After installing the transaction manager, the same system could handle 800 users before it ran out of response time.

How the Client-Server Approach Works

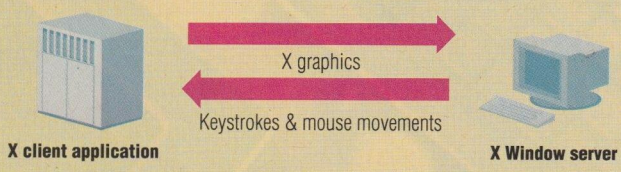
Client-Server Database Architectures

In a client-server database, the client process converts data requests into SQL messages and sends them to the server, which finds the data and returns it to the client. The database server can be optimized to improve performance greater than having the database on the user's workstation.



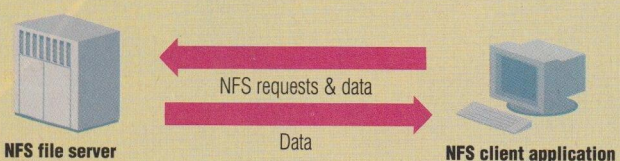
X Windows Applications Architectures

Under X Windows, the client is the application that asks the server— the X terminal— to update a screen display.



Network File System Architectures

In a distributed file system based on Sun's Network File System (NFS), a remote file system appears as a local file system to users and applications. An application opens, reads from, and writes to files through the NFS client process, which passes requests across the network to access remote files.



Store the SQL, Hot-Rod the Hardware

Aside from the quantity of SQL messages, another source of problems is the length or complexity of each SQL message. SQL is not simply a protocol; it's a programming language for databases, which makes it very flexible. However, decoding the SQL message may take up a sizable part of the time the database server spends on each query. That decoding time is wasted if the client always sends the same SQL message, asking for the same information from many different database records.

In such cases, accounts receivable applications or hotel reservation systems for example, it makes more sense to store a pre-compiled and pre-optimized SQL program at the database server. That way, little more than data moves between client and server, and the query runs at top speed. Sybase pioneered this "stored procedure" technique for its database managers. Other database vendors are following suit.

The database server's hardware is another source of slowdowns. However, because a client-server architecture allows for specialized machines, you can optimize critical features of your database server. The server's disk system can be beefed up with such hardware as dual-ported disk drives, which allow more than one processor to read data at once. Disk mirroring, in which the same data is available on two different disks, can speed up access as well.

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A client-server architecture even makes it possible to split data between two or more database servers. For a complex query, each server can retrieve part of the necessary data. However, one computer will still have to assemble the final response to the client's data query.

Client-Server X Windows Performance

At first glance, client-server applications based on the X Window System look much like client-server databases, but with a crucial difference: the user sits at the server side, not the client side. The client is an application that asks the server–the X terminal–to update a screen display. As with SQL database messages, much of the traffic between client and server is small, simple messages. There's a greater chance that an X message will contain a large piece of data such as a bit-map image.

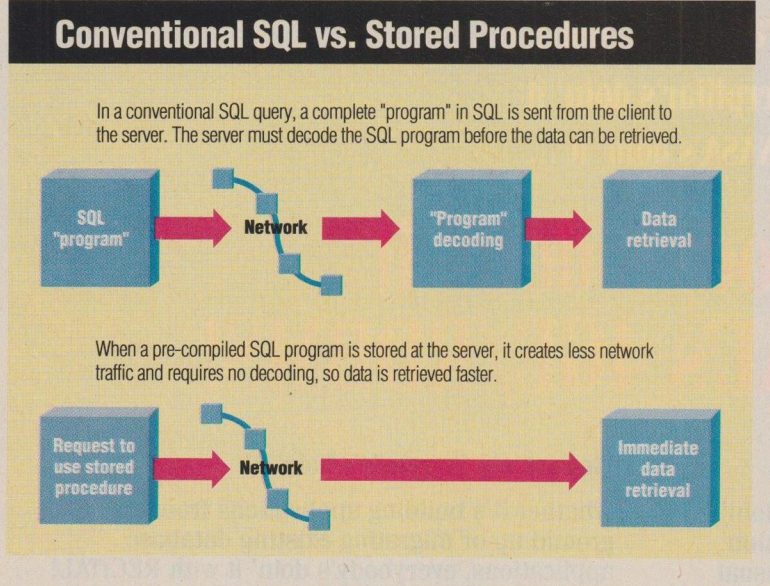
It's not the large messages that cause the most problems for X applications, according to Mike Harrigan, vice president of market development at X-terminal vendor Network Computing Devices (NCD). Harrigan says the biggest performance killer is a lack of memory for running client applications. If the machine running the client must "page out" part of the program (that is, stop the program and copy part of it to disk while another program uses the limited available memory), performance slows to a crawl. The obvious solution: add enough memory so that no application needs to be paged out–typically eight to 12 megabytes of memory for UNIX, plus one to four megabytes per user.

Harrigan says that "most X traffic is relatively benign" to the network and up to 100 X users can usually coexist on a single Ethernet strand. The system can still bottleneck where the network meets the client-application computer if the network interface doesn't support the full Ethernet bandwidth. This problem has a straightforward solution: a more powerful network interface card. Another alternative is adding a second network interface to the client-application computer.

In cases in which X Windows network traffic consists mostly of bit-mapped graphics, Harrigan says, image compression can help. There's currently no single industry standard for an X-Window image compression scheme, but Digital Equipment Corp. has proposed its X Image Extensions (XIE) and NCD has offered its Simple Image Extensions (SIE) to become part of the X Window System. In addition, if the network simply becomes too crowded, routers can be used to reorganize the network into smaller subnets.

Finally, X servers themselves need plenty of memory and CPU horsepower. PCs running X terminal emulation may work for simple applications, but even low-end dedicated X terminals run about five times faster than PCs. Workstations can run as much as 20 times faster.

Conventional SQL vs. Stored Procedures



Client-Server NFS Performance

Distributed file systems based on Sun's Network File System (NFS) have the same basic structure as SQL databases and X applications. The difference that makes NFS so popular is that it works with existing applications; they don't have to be specially written or modified to work with NFS. An application can open, read from, or write to a remote file as if the file were in its own file system.

NFS allows every user's computer to be both a client and a server able to use and share every file on the network. That may sound like the ultimate distributed file system, but it's actually the ultimate bottleneck, according to Carl Stolle, Sun's product line manager for SPARCservers. Too much traffic through a single workstation can bring every process involved grinding to a halt when the clients requesting files are competing for CPU and disk access time with the user who's trying to run applications. Stolle says you can get by without a dedicated file server in a small workgroup of less than 10 clients, but only if there's plenty of memory and disk space.

Dedicated file servers need plenty of memory and disk, too. Potential NFS bottlenecks include a shortage of buffers, or NFS software that's not properly tuned.

Disk I/O can be another bottleneck because a file server spends most of its time reading and writing disk data. A disk cache can help speed throughput. As with X, network connections can be a problem for large networks using NFS. One solution is to beef up file servers with intelligent Ethernet controllers that also process NFS requests. These controllers can be purchased from vendors such as Interphase and Legato Systems.

Is a client-server structure fast enough? There's no simple answer. The trade-offs depend less on client-server philosophy than on the specific architecture you're considering.

Knowing where the bottlenecks lie, and how to get around them, can make the difference between a client-server system that works and one that will catch up to your demands. ■

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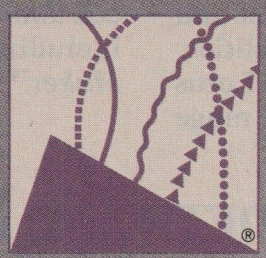

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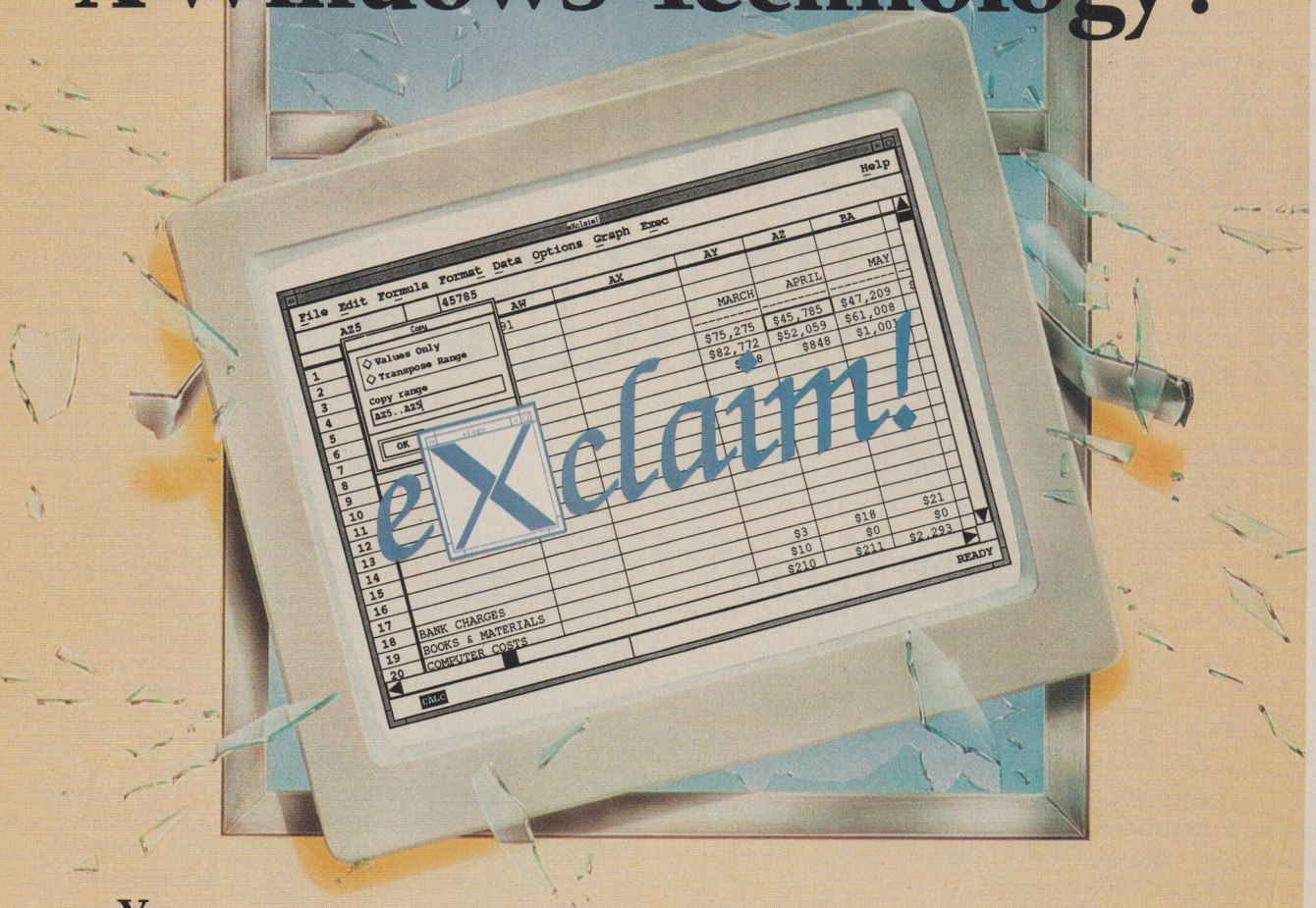

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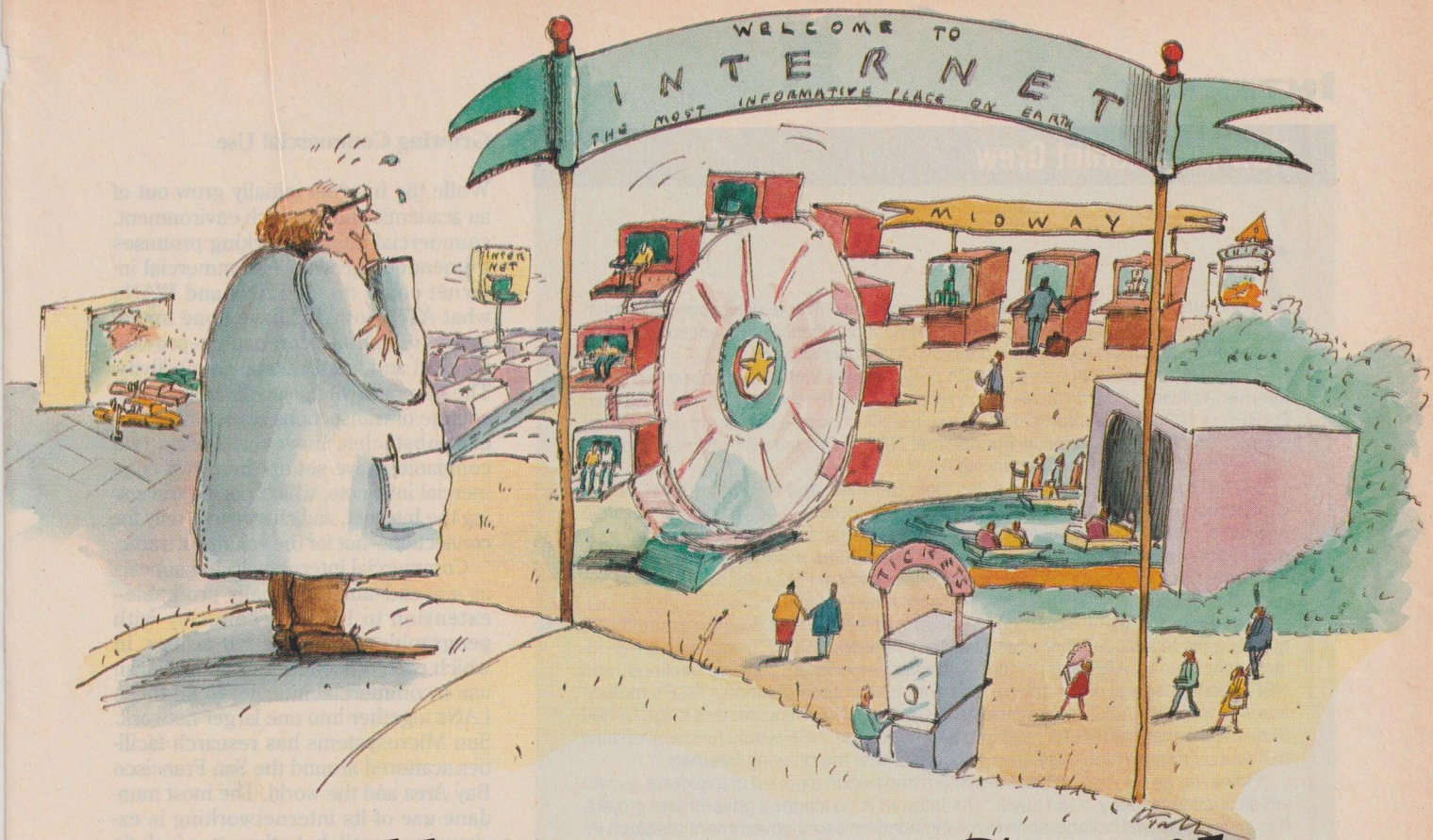

Will Success Spoil the INTERNET?

The world's biggest network struggles with creeping commercialism

His work may revolve around investigating the high mysteries of thunderstorms, but meteorologist Kelvin Droegemeier starts his day with the ordinary task of reading his mail. When Droegemeier, an assistant professor at the University of Oklahoma, sits down at his workstation, the first thing he does is open an electronic window onto Internet.

Droegemeier and thousands of researchers in public and private institutions depend on Internet for their daily work. They use this amorphous, enormous, UNIX-based network of networks much in the same way other organizations depend upon the office bulletin board, paper mail, phone calls, and coffee-room gossip. Internet's free flow of ideas, chitchat, news, and varied information has gained it more than half a million routine users and thousands of zealots worldwide.

The size and success of the Internet are spawning interest on its money-making possibilities. Under consideration are a straightforward charge for use of Internet, a gray area where private enterprise already offers some services on the free Internet; and most importantly, the development of separate, parallel networks that resemble Internet, but are strictly commercial.

Miles and Miles of Interconnection

Sometimes called the "anarchy net" because it lacks a single organizing point of contact, the Internet is the largest network in the world. More than 5,000 local-area networks (LANs) and a smaller number of national and international wide-area networks (WANs or "backbones") make up the Internet, according to Vinton Cerf, chairman of the Internet Activities Board,

By Rik Farrow

How the Internet Grew

The Internet was an experiment that grew and grew. The earliest sponsor of interconnecting regional networks was the Department of Defense's Advanced Research Project Administration (DARPA) started by Dr. Robert Kahn in 1973.

"Originally, the Internet was a DARPA project," says Vinton Cerf, chairman of the Internet Activities Board. "I picked up responsibility for the project when I joined DARPA in 1976. In the intervening period, the effort gained additional government support from National Science Foundation, NASA, Department of Energy, and a number of other government agencies."

DARPA funded the purchase of four Bolt, Beranek, and Neuman (BBN) routing computers, and leased the lines to connect the routers. The definitions of these protocols, used to communicate between these centers in what was planned as a research network, were published on the network as a series of papers called Requests For Comments (RFCs). Today, thousands of RFCs define TCP/IP, along with other modules, such as Simple Network Mail Protocol.

The original DARPA experiment, called ARPANET, was so successful that it quickly grew to include other sites. A military network, MILNET, was set up with interconnections to ARPANET. Later, Defense Department funding declined, and NSF, another federal organization, took over as a source of money. NSF's motivation was to build a network to connect the six supercomputing centers in the United States with other centers for research and education. NSF would fund universities to help buy routers and lease lines to connect with the growing Internet.

"However, by the mid-1980s, the system had begun a period of explosive growth which continues today," Cerf says. "The Internet is no longer a government project. It is an international collaboration involving academic and government research institutions and organizations, private non-profit and for-profit industrial organizations, various international academic consortia and associations, and so on."

Internet is operated as "a grand collaboration," says Cerf, with no central control outside of the Internet Activities Board and its subsidiary components, the Internet Engineering Task Force and the Internet Research Task Force. These "try to organize the evolution of the protocols of the Internet in some coherent fashion."

Internet is a distributed system that evolved, rather than was built from a set of specifications, and it is hard to describe accurately. The best description is that the Internet is the network of networks that work together using TCP/IP. Yet, while TCP/IP holds the Internet together, Internet is much more than a set of protocols.

Until the last few years, connecting to the Internet required the approval of a U.S. government sponsor. This requirement has been relaxed, says Cerf, but only institutions involved in education and research can connect directly to the Internet. If you work within such an organization, and want to participate, you need to find which of the some 24 regional, or mid-level, networks in the United States can connect you to Internet. *–R.F.*

the closest thing it has to a governing body.

The Internet connects major research institutions, including universities and national labs, and private companies involved in government-sponsored research or education. The backbones link to smaller regional networks, which link to complex LANs at various sites. Their common connection is that all support TCP/IP for computer communication, a standard that can be used to connect any computer on a LAN with the Internet.

The Internet has been called the world's most important bulletin board system. Thousands of computer users, mainly programmers and scientists, "drop in" every day for their news. "Thirty-five or more countries incorporate over 313,000 hosts and millions of users in the existing system," says Cerf.

Involved in the control of the Internet is the Federal Research Internet Coordinating Committee (FRICC). It is composed of various U.S. federal agencies, and within it is the Internet Activities Board, responsible for overall design and planning. The mid-level and regional U.S. networks are coordinated through FARNET, the Federation of American Research Networks. SRI International, a private, non-profit research company in Menlo Park, Calif., handles much of the administration of the Internet. Merit, a consortium of Michigan state-supported networks, provides support for the operation of the National Science Foundation's NSFNET backbone.

Growing Commercial Use

While the Internet initially grew out of an academic and research environment, commercial internetworking promises tremendous growth. A commercial internet could do for LANs and WANs what AT&T or MCI have done for regional telephone companies–provide national and international connectivity. The sheer size of the job of tracking this volume of transactions presents significant obstacles, however. Today, two companies have set up their own commercial internets, which permit traversing the Internet, and charge fees only for connections–not for the volume of traffic.

Commercial internetworking appeals as a useful–and potentially profitable–extension to LANs. A company with geographically distributed offices, in which each office has its own LAN, can use a commercial internet to tie these LANs together into one larger network. Sun Microsystems has research facilities scattered around the San Francisco Bay Area and the world. The most mundane use of its internetworking is exchanging e-mail, but other uses include exchanging whole files of information rather than sending a fax or mailing a tape.

Some organizations have moved to company-wide internets, especially when security is an issue. By purchasing routers and leasing T1 lines, the high-speed lines used for long distance telephone trunks, a company can have the advantage of nearly instantaneous, high-bandwidth communication between computers on widely spaced networks. Lucasfilms, for example, uses a single T1 line between its San Francisco Bay Area facilities and Los Angeles studios. This T1 connection can transfer digitized film images in hours or minutes, as opposed to using overnight mail or courier services to transmit the same thing. Harris Corp. has a network that allows auto manufacturers to download specifications from computer-aided design workstations in Detroit to fabrication facilities in Florida for the chips used in automobiles.

Committees are working within the Internet community to extend access to for-profit uses. Many problems arise around converting a service traditionally supported by research funds to one shared equally with for-profit traffic. Traffic across some points of the Internet is already measured in billions of transfers each month, says Rick Adams, one of the founders of UUNET, a company

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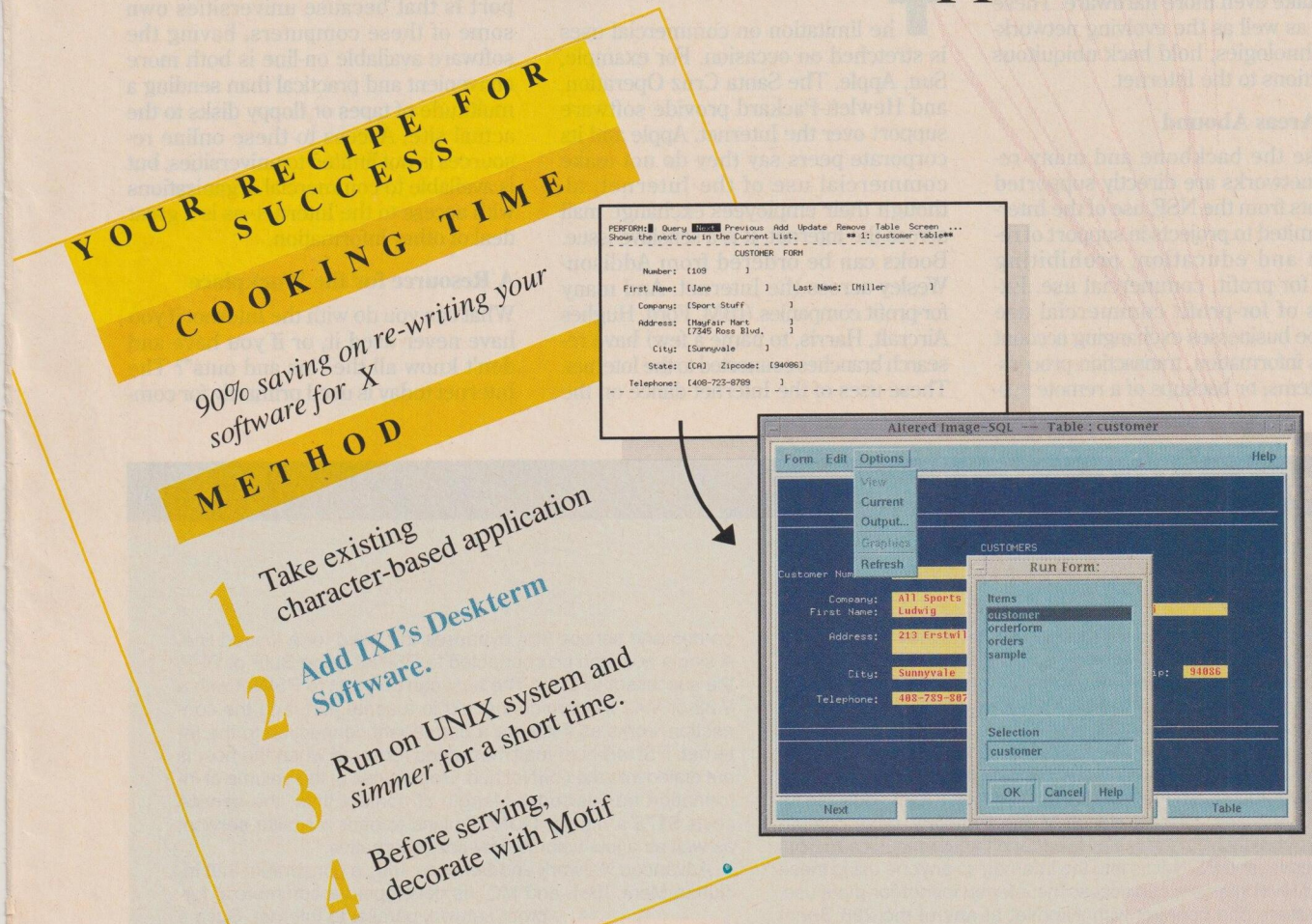

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providing commercial access to several mid-level internets. Just recording these transactions could require supercomputers and calculating charges fairly would take even more hardware. These issues, as well as the evolving networking technologies, hold back ubiquitous connections to the Internet.

Gray Areas Abound

Because the backbone and many regional networks are directly supported by grants from the NSF, use of the Internet is limited to projects in support of research and education, prohibiting direct, for-profit, commercial use. Examples of for-profit commercial use would be businesses exchanging account or sales information, transaction processing systems, or backups of a remote system's database across the Internet. Certainly, selling access to the Internet would seem to be a prohibited use.

The limitation on commercial uses is stretched on occasion. For example, Sun, Apple, The Santa Cruz Operation, and Hewlett-Packard provide software support over the Internet. Apple and its corporate peers say they do not make commercial use of the Internet, although their employees exchange mail across the Internet. It is a sensitive issue. Books can be ordered from Addison-Wesley across the Internet. And many for-profit companies (IBM, Ford, Hughes Aircraft, Harris, to name a few) have research branches connected to the Internet. These uses of the Internet dance on the fine line between uses that fit the NSF guidelines and commercial use.

The rationale given by companies that use the Internet for service and support is that because universities own some of these computers, having the software available on-line is both more convenient and practical than sending a multitude of tapes or floppy disks to the actual site. Access to these online resources is not limited to universities, but is available to commercial organizations with access to the Internet–as is a great deal of other information.

A Resource for the Workplace

What can you do with the Internet if you have never used it, or if you have and don't know all the "ins and outs"? The Internet today is used primarily for com-

Commercial Links to the Internet

Two public, commercially usable, mid-level internets have recently been launched. AlterNet is provided by UUNET Technologies, Inc. PSINet, for Performance Systems International, was founded by the organization managing NYSERNET, a New York regional network. These mid-level internets provide nationwide connectivity and permit a company with widely distributed offices to be interconnected without the cost of maintaining its own routers and high-speed leased digital lines. Besides interconnecting different offices of one company, other companies can share the same network and intercommunicate. Both AlterNet and PSINet tie into the Internet, so anyone using these mid-level internets can access the Internet for not-for-profit use.

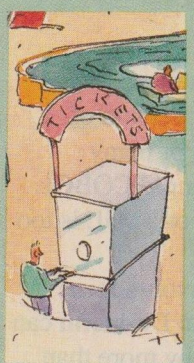
Users can connect with AlterNet at any of the 296 Sprint points-of-presence, where local connections are made into AlterNet via leased lines. Connections closer to a point-of-presence are cheaper. If you live in the Wyoming, your hub could be in another state, but if you live in New York, it might be across town.

AlterNet estimates the monthly cost of a T1 or 1.5-megabit connection would run at about $3,250. By comparison, a typical leased T1 line can cost $8,000 a month or more. To join AlterNet, however, the participant must pay some up-front costs. You must buy routers and DSU/DCU (the T1 modem equivalents) for the local site and hub, at a cost of about $13,000, according to UUNET literature. Less costly alternatives offer lower line speeds, with monthly rates in the neighborhood of $380, and startup costs under $2,750.

PSINet currently has 27 hubs and plans to install hubs at 40 more sites. A major difference between the two commercial internets is that PSINet owns and maintains all the routers and DCUs/DSUs necessary for a high-speed connection. The participating organization must make secure and suitable space and power available for the internetworking equipment, but the equipment is owned by PSI, says Marty Schoftall, vice president of PSINet.

PSINet also offers a low-cost, dial-up, 9.6-kilobit connection called DCS, Direct Connect Service. Unlike the leased line solution, the dial-up connection provides a relatively low-speed on-demand service that bypasses the need for a leased line. A single host can be connected to PSINet using SLIP or PPP, the successor to SLIP. The host can connect to PSINet with a V.32 or V.42 modem connected to a serial port, and the connection works as if it were a permanent connection to the Internet. PSI will hold mail messages received when the host is not dialed into the PSINet hub. Regardless of the volume of information transferred, or length of contact time, the service costs $175 a month. UUNET plans to offer a similar service, as well as a low-volume, low-cost alternative.

Advanced Network and Services, Inc., a consortium that includes Merit, IBM, and MCI, is developing a commercial for-profit network parallel to Internet. Such a network would offer an alternative to Internet without some of the built-in problems. Yet it would have its own. For one, it would take years for such a network to grow to the size and have the connections of the Internet. Another is that connections between the for-profit internet and the Internet would certainly be desirable. Today's routing algorithms do not distinguish between different networks other than to choose the quickest path on occasion. For-profit messages would still wind up crossing the research-oriented Internet.



Meanwhile, PSI and UUNET have advanced their own goals of extending commercial networking. On March 25, 1991, PSINet and AlterNet announced a connection to CERFnet, a California-based mid-level network managed by General Atomics in San Diego, and to each other. These three internets are connected in San Francisco, providing commercial internetworking to any client on any of the three internets. UUNET's AlterNet has also announced a connection to the New England regional internet, NEARnet, which will permit sending commercial traffic between sites connected to these networks without using the restricted NSFNet backbones. *–R.F.*

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municating from a remote location, transferring files from one system to another, sending mail, and reading news and entertainment.

Randall Robinson, administrator of the Internet link at NASA Ames often finds himself browsing through countless articles posted to Usenet, the Internet's distributed bulletin board. "I get the information I need, and I get it while it is still useful," says Robinson. Within the news, programs, and new ideas Robinson finds on Internet is information of immediate importance. For example, one person at NASA Ames uses information taken from Usenet to provide up-to-date information on computer viruses plaguing PCs.

The Internet can also save time and trouble when it comes to system administration. One of the most practical uses is distributing patches for operating systems. Engineers who work with UNIX at Hughes in Denver get patches to the Sun operating system for their network of more than 90 Suns as the patches are posted on the Internet by Sun. As in many other large organizations, the engineers say it is much simpler to get the patches over the Internet than it is to go through procurement processes to get tapes of software updates.

Sometimes these networked communications can have commercial repercussions. For instance, bad security showed up in a vendor's operating system. Internet user Joern Lubkoll, in Berlin, complained to the vendor. When six months had passed without Lubkoll receiving a satisfactory response from the vendor, he decided to go public. In the UNIX community, that means going to the Internet. Lubkoll posted the problem to the Internet security news group.

The posting prompted responses from others all over the world on the Internet. Some had seen the problem, some had not. The vendor was on the Internet and began responding. So did other vendors, who said they had fixed the bug over a year ago. One response from Dell Computers said the bug had been found in a different PC UNIX. The end result is that Internet now has a program to download and test for the bug, and people were alerted to find out if they had the same problem.

Who Pays for All This Great Stuff?

One problem with commercial use of the Internet is the question of how to charge users. Message routing is done each time a datagram passes through a router. A datagram might start at a commercial site connected to the Internet, then pass across several university campuses on its way to another branch of the same business. Should universities bear the cost of supporting commercial traffic across their WANs? As use increases, should non-profit research organizations be forced to expand their networks' bandwidth (measure of how fast information is transmitted) to support commercial use? How will these entities maintain adequate response for their own uses?

For commercial use of the Internet to work, such use must pay its own way. Allan Weiss, president of Advanced Network and Services, Inc. (ANS), and UUNET's Rick Adams disagree on commercial use of the Internet. Weiss says it can be done; Adams says it is not practical.

ANS, a consortium consisting of Merit (the Michigan mid-level network that manages the NSF backbone), IBM, and MCI, has sponsored meetings directed toward the goal of metering Internet usage. According to Weiss, this seemingly insoluble problem may have a solution. Others are not as hopeful. Billions of datagrams, each containing all or part of a message, pass across the NSF backbone each month. According to Adams, just routing these packets across the T3 backbone, a 45 megabit per second fiber-optic link, requires all of the horsepower available in IBM's RS/6000, and it can only keep up with 88 percent of the total potential bandwidth, or about 40 megabits per second.

Very fast routing computers would not only have to do the job of routing datagrams, but also collecting source information from each datagram, and squirreling this information away until it could be gathered. Once this mass of information is gathered, it must be processed and billed to the tens of thousands of organizations using the Internet.

Unlike the telephone system that already performs a similar billing job, Internet billing would be for each datagram sent, not for an entire connection. Internet does not use an end-to-end connection, so datagrams may travel many pathways during the course of one login session, file transfer, or mail transmission. Instead of a single record for each transaction, the numbers of records could reach tens of thousands. Simply administering the volume of data could require supercomputers. Running the billing system could cost more than funding the Internet itself, says Adams. *–R.F.*

In a way, the Internet is a form of artificial reality, as participants in the news groups may communicate with a lot of people they never see because they deal with people over a computerized bulletin board or conferencing system. A meteorologist might study weather, talk to other meteorologists on the Internet, have discussions, and float ideas on a daily basis. His electronic colleagues could be geographically far removed, or working for the competition, but it is understood that users of the Internet will share ideas. Communicating over the network puts you in contact with people with similar interests. Meteorologist Droegemeier recently hired two graduate students who had been investigating thunderstorms with him via the Internet.

Internet is also the source of 1,500 megabytes of software, says UUNET spokesperson Donnalyn Frey. A programmer interested in acquiring **emacs**, a popular editor, could download the source code across the Internet. Software consultant Rick Farris downloaded **emacs** from Internet for use on his home PC and built it into his system. Yet **emacs** is just one example of tens of thousands of varieties of software available free on Internet.

The Most Fun You Can Have with a Terminal

Newsgroups form the core of Internet's alternate reality and, for many people, are the most fun part of being connected to other hosts. Interacting with these groups is a way to conference with the outside world, to share opinions or gather information for personal and professional use. There are several hundred newsgroups with topics ranging from artificial intelligence to singles (male or female). Users can choose what they want to read in a particular newsgroup and respond, and the response is posted to all subscribers of that particular newsgroup.

Newsgroups can be used as a sounding board for new ideas or techniques. Occasionally, sections of code or short programs that are immediately useful will appear in the news. On a more personal level, people have met, dated, and even married after having met through

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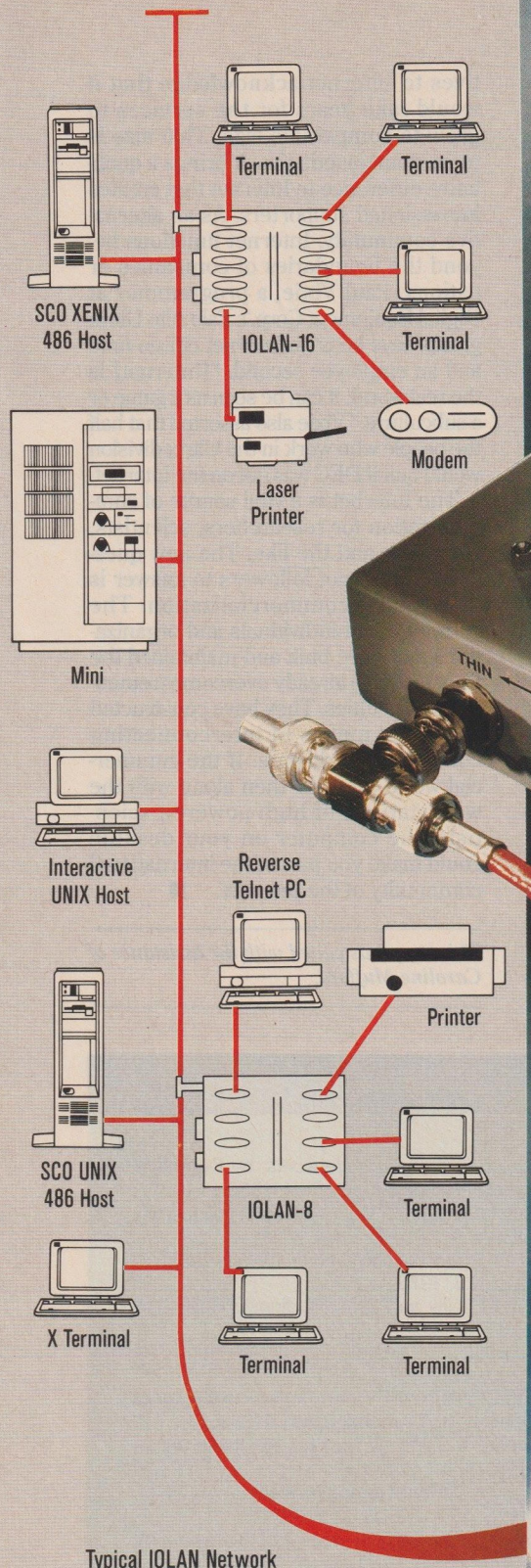

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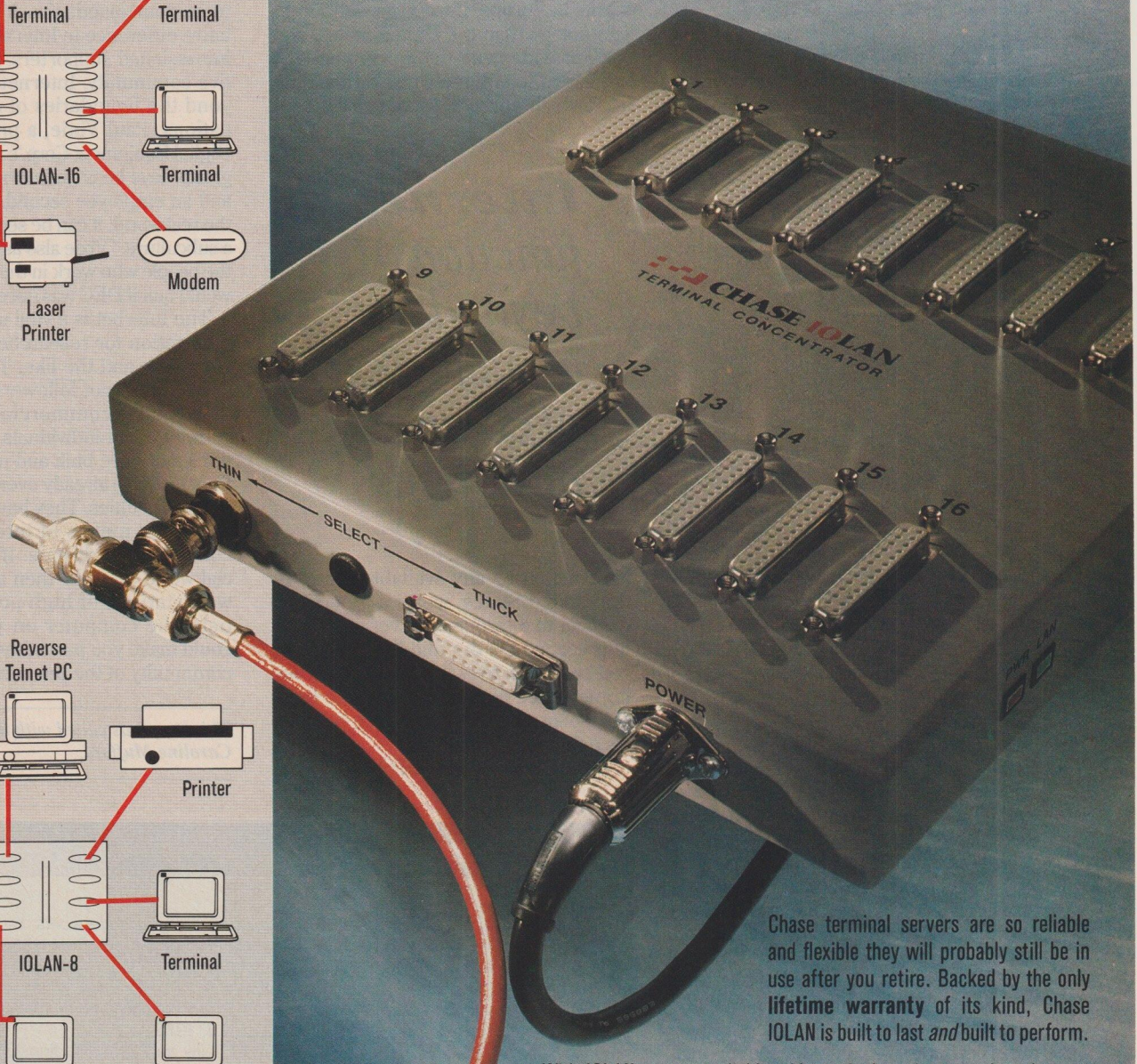

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the "personals" newsgroups, such as soc.singles or soc.women. Just perusing the newsgroups that interest you can take up a good portion of your day.

The Future of the Internet

Someday the Internet may become for computer users what the telephone system has become for most people–a universally available, reliable, high-speed communication medium. Individuals without university or research affiliations will be able to connect to the Internet.

***Internet** functions beyond the boundaries of companies or nations*

Serial Line Internet Protocol (SLIP) and Point to Point Protocol (PPP) are designed to support TCP/IP between two points over serial lines. Although some technical problems still need to be worked out, newer 9600-baud modems will permit on-demand connections between a small network, or even a home computer, and new commercial internets, such as UUNET's AlterNet or Performance Systems International's PSINet (see "Commercial Links to the Internet"). A host computer owned by these mid-level internetworks would hold incoming mail and datagrams during the time the serial connection is not active. A spokesperson for AlterNet has suggested it will provide a low-cost, limited-use, service that will make home use affordable.

These services aim to capture the ordinary business market as similar services have in Europe. Kim Biel-Nielsen, director of sales and marketing for the Danish company Uniware, takes his portable PC with him when he travels around Europe on business. He says he can use it to log in across the network to his home system for less than a long distance phone call. This emerging standard of communication is what PSINet hopes to set up in the United States.

Local dialup network access is already the most popular network service provided by the commercial X.25 networks in Europe. Europe uses different technology than the United States, and X.25 provides end-to-end connections similar to telephone calls, rather than TCP, which works by sending packets of information by any available route. In the United States, using a modem to connect to a terminal server at a point-of-presence for the mid-level internet, you can log in over the network to your home office network. Using the local point-of-presence saves money because it's only a local phone call.

Developers of commercial alternatives to Internet acknowledge that it would take years for the services to grow to comparable size. That size is more than quantitative; it brings a qualitative difference to Internet that creates impassioned supporters. As an alternative community, Internet functions beyond the boundaries of companies or nations. Paul Vixie, a programmer at Digital Equipment Corp.'s Palo Alto Ultrix group, says he is an Internet citizen first, and an employee second. "[Internet] is the real world. It can be seen as a game or a subculture." Vixie also asserted that half the people who work in the Ultrix division would quit if DEC was not on the Internet.

The Internet is a vital source of communication for researchers, scientists, engineers and the like. The new question for Internet followers to answer is its pending commercialization. The community of individuals and organizations that have built and maintained the Internet have already overcome tremendous difficulties. They have constructed a reliable means of interconnecting computers worldwide. If the commercial world prevails, then along with the workstations of high-powered scientists, the computer on your desktop could make you part of the international community of the Internet. ■

This story was edited with the assistance of Caroline Mufford.

For Further Information

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- "Where to Start–a Bibliography," rfc1175, available online from Internet archives or via uucp from UUNET.

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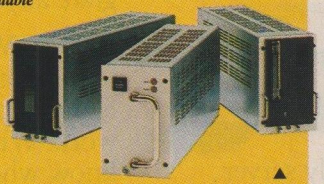

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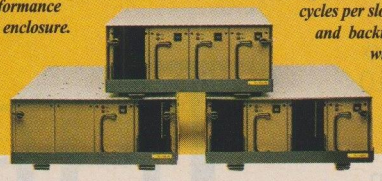

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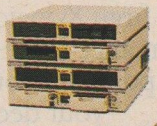

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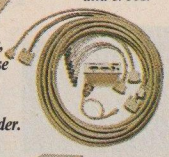

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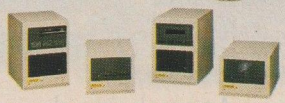

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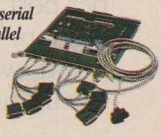

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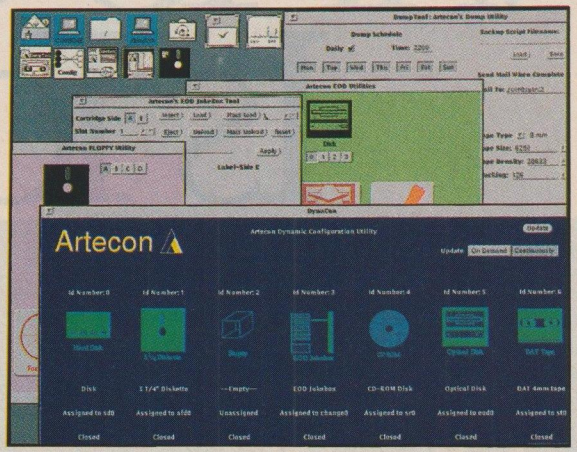

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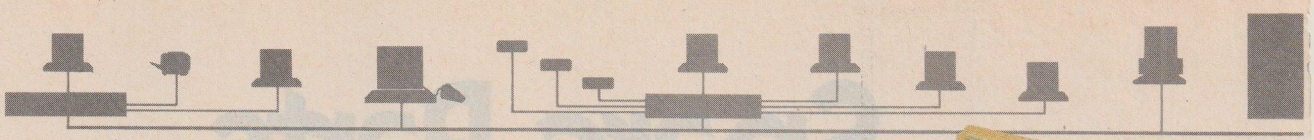

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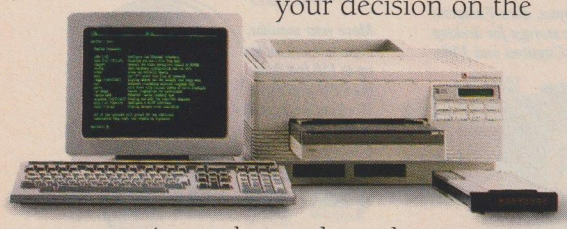

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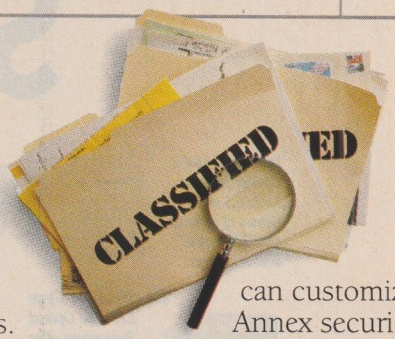

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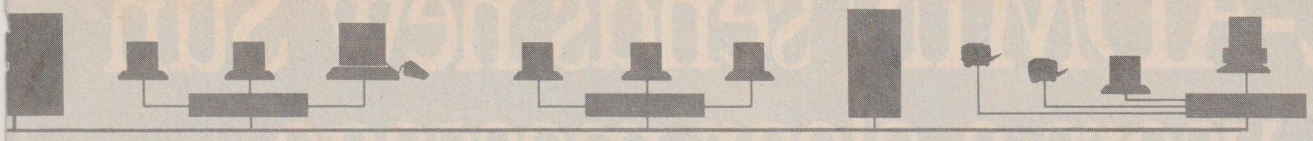

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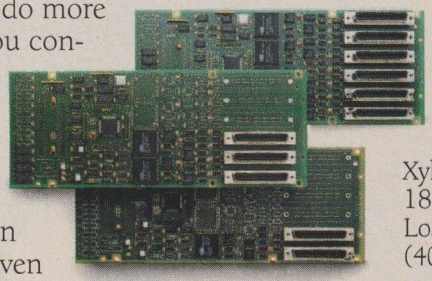

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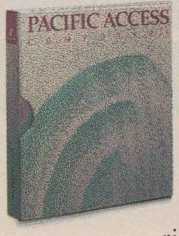

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CIRCLE NO. 240 ON INQUIRY CARD

Getting It On Tape

By Howard Baldwin

TOM UPTON

Buying a high-capacity tape drive for backups? The important issues are space, time, and money

When T. Boone Pickens Jr. and Carl Icahn targeted Phillips Petroleum as a takeover target, the United States' ninth-largest oil company began downsizing. The effort encompassed everything from selling off its uranium mines to laying off the computer operators who assisted system administrators in backing up computer data. The job of automating tape backup was passed down to Stan Lorenzen, one of Phillips' seismic computer application developers.

Working with a network of DECstations, Lorenzen didn't want to have to switch a lot of tapes. His goal was to eventually automate the system to run with no operators at all. He considered buying low-cost high-capacity tapes. Lorenzen decided on a Summus jukebox that incorporates two Exabyte drives and robotic mechanisms for loading and unloading tapes. The jukebox came with UNIX utilities that initiate simple actions like loading, unloading, and confirming the presence of a tape. Lorenzen wrote a shell script that combined the commands he needed. "I had to get used to writing shell scripts," he admits.

Adding that it was "a good learning experience," Lorenzen feels that Summus "has taken the best route by providing the essential utilities. Each company is going to be a little different. You couldn't [write an application] specific for each one."

The criteria for buying tape backup systems, Lorenzen decided, are space, time and money. Space relates to capacity and time relates to how quickly a drive can back up the data in your computers.

Two other issues come up. You may want to maintain a standard tape format throughout your company. Second, and perhaps more important, is whether any software accompanies the tape drive to make backup easier.

If you're looking for a tape drive, you've probably been bombarded by vendors espousing the merits of 4-millimeter tapes vs. 8-millimeter tapes, both of which are about the size of audio cassettes. These new smaller tapes are the new kids on the block. They have a higher capacity than QIC (quarter-inch cartridge) tapes, which come are about the size of VCR tapes, or

nine-track tapes, which are on large reels.

If you are going to make the switch to one of the new formats, you'll probably want to maintain consistency throughout your organization. Consultant John Bass recommends that you should decide whether or not you'll be using it for media interchange–exchanging data between computers. "If you need to trade tapes with another site or another machine, you need to be aware of standards within your organization," he advises. He suggests that people be aware of different formats, even within the same kind of drives. QIC drives, for instance, offer at least four different formats.

While Exabyte is the sole manufacturer of 8mm drives, quite a few companies manufacture 4mm drives. Among others, you'll find Wangdat, Ardat, R-Byte, and Wangtek. All of these manufacturers sell to companies that resell to users, so be sure to ask which company's drive is being used in order to simplify maintenance.

Media interchange may "open up a Pandora's box," warns Bass. "It may require one or more machines in your organization having multiple tape drives." Because each can be different, depending on how the software configures the data on the tape, switching may involve first rewriting the data back to disk.

Supporting the Software

Tape drives are traditionally used for backup which can be simplified with various utilities and software products. Decide whether you want software to help you do your backup, or if you want to create your own backup system using UNIX utilities and shell scripts. The people interviewed for this story recommend looking at these capabilities closely to determine which fits your installation best.

Mike Petry, assistant director of the computer science center at the University of Maryland in College Park, faced a combination of machines running Ultrix, Berkeley UNIX, and others. "We wrote the scripts ourselves. We tried to use the standard **dump** utilities and then build on top of those."

Travis Bissett, an engineer at Allied Signal Aerospace, disagrees with "roll-your-own" logic. For him, it's more important that the utility be easy to use. "We're engineers, not system administrators," he argues. "What I know about maintaining a system is what I've learned the hard way." Bissett recommends looking at what kind of utilities come with the drive. On his wish list: "A nice windowing interface to augment the power of the operating system."

Bissett currently uses an Irwin Magnetics quarter-inch tape drive for his 386-based PC running XENIX. Three other Irwin drives are attached to Compaq Deskpros and serve 110 project engineers. Following Irwin's instructions, Bissett obtained the appropriate driver software from The Santa Cruz Operation over the UUCP network. He used the utilities within the operating system to devise an archiving sequence, but the software still doesn't take care of all his needs. "It's more limited in functionality that what comes on the DOS side," he laments. "I can't figure out how to tell the drive to go to the end of a current file so I can put more than one file on the tape."

A tape drive used for backup can be a savior in time of disaster

Bissett would also prefer more guidance when it comes to formatting the tapes themselves. Although Irwin recommends buying preformatted tapes, Bissett has been using unformatted tapes. While there's been some trouble getting them formatted–it sometimes takes a few attempts–but eventually the tapes are ready to use. "It may be a learning curve issue," admits Bissett. "But if the manufacturer could make it go away, we'd be happier."

While Lorenzen and Bissett are divided on the "roll-your-own" question, other users declare that software that helps with backups is a must. For Sandy Ellwood, systems administrator at a General Electric facility, backup originally involved eight hours of switching tapes. Her network incorporates 48 Sun Microsystems workstations and two Sun servers that are used by developers creating software for microprocessor controllers in transit vehicles and locomotives.

Ellwood has purchased three Exabyte drives–one each from Sun, Sun reseller Parity, and Delta Microsystems. All three drives can use software from Delta Microsystems called Budtool. "It works across the network and has a nice little calendar that lets you schedule backups a year in advance," notes Ellwood. It also prompts her to put in a tape via a mail message around noon every day.

Users recommend higher-capacity tape drives simply because the more data you can fit on the tape, the less often you have to switch tapes, and the fewer tapes you need. Ellwood notes that a Level 0 backup–a full backup of all data on the system–requires only two tapes, and "even if I lost my disk, it wouldn't take more than four hours to restore" the system. The tape capacity is 2.2 gigabytes vs. 150 megabytes for the quarter-inch tapes she used to use, and the cartridges themselves cost about $7, as opposed to $35 each for the 150-megabyte tape cartridges.

Back Up for Backup

Because a tape drive used for backup is in many cases a savior in time of disaster, ask tape drive vendors how they address support. GE's Ellwood originally had a tape drive she calls a "lemon," that she had to send back several times for repair. Find out how quickly you can get

Selected Manufacturers and Vendors of Tape Drives

Ardat 1650 Sunflower Ave., Costa Mesa, CA 92626; 714-641-1230

Delta Microsystems 111 Lindbergh Ave., Ste. C, Livermore, CA 94550; 415-449-6881

Exabyte 1745 38th St., Boulder, CO 80301; 303-442-4333 ex. 434

Irwin Magnetic Systems 2101 Commonwealth Blvd., Ann Arbor, MI 48105; 313-930-9000

Parity Systems 504-A Vandell Way, Campbell, CA 95008; 408-378-1000

R-Byte 2043 Zanker Rd., San Jose, CA 95131; 408-452-8860

Summus 17171 Park Row #300, Houston, TX 77084; 713-492-6611

Wangdat 140 Technology, Irvine, CA 92718; 714-241-9613

Wangtek 41 Moreland Rd., Simi Valley, CA 93065; 805-583-5255

This list contains contact information only for those vendors mentioned in this article and is not intended to represent all of the vendors in this market.

a replacement unit: some vendors offer a 24-hour turnaround time.

Another way to ensure support in time of disaster is to look for a drive that works with several machines. Robert Mattie is principal scientific analyst in the research and development department for pharmaceutical manufacturer Smith, Kline and Beecham. He highly recommends this plan of action. "If we had to restore a system from ground zero, and we didn't have the proper interface software, we still wanted to get the system back from the tape."

Mattie's strategy was proven sound when he moved two dozen users between a Sun SPARC-based server and a Digital Equipment Corp. Ultrix-based server. "We backed up all of their files from the old server onto the 8mm tape, and fed it back onto the other server. It took between 15 and 20 minutes."

One final facet of tape drives to be aware of is its error-correction capabilities. Because more tape drives are using data compression techniques, and data density on tapes is becoming higher, error-correction is becoming a must for increased reliability. It goes back to the question of using the tape for its true purpose–to restore what you may have lost.

And Now for Cost

The ultimate parameter for most real-world purchase decisions is money, but it's even more of a factor with tape drives. "It's a capacity issue," says Bass. He suggests weighing the cost of the media inventory against the cost of the drive itself. "To routinely back up a 600-megabyte drive, you may end up with $1,000 of tapes, when the tape drive only cost $600. It would be cheaper to get a high-capacity drive and have a lower media inventory."

GE's Ellwood concurs. Don't be afraid to buy a second drive, because the time saving will soon outweigh the cost, she says. "You become very dependent on these very quickly," she says, explaining that she bought a second unit to act as a backup for the first one. "It's amazing how fast systems grow. We wound up with so much data, we needed all three [of our] drives anyway."

Two other related facets are also important to remember, though. Tape drives are supposed to provide an insurance policy for your data and should ideally make it easy for you to store data. While user preference is still divided on whether applications should help you, or whether you should have the flexibility to do it yourself, you can make your selection based on the needs within your company and the expertise of your users. ■

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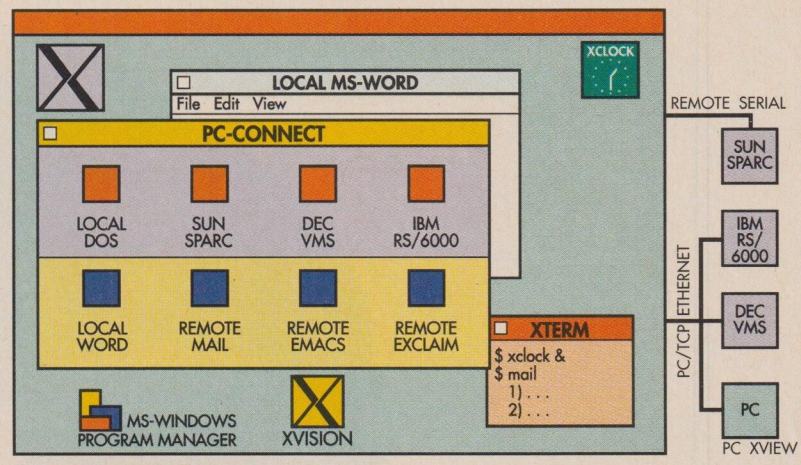

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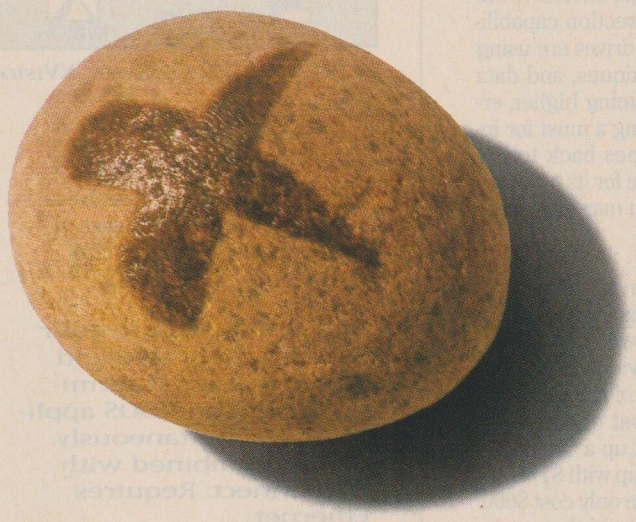

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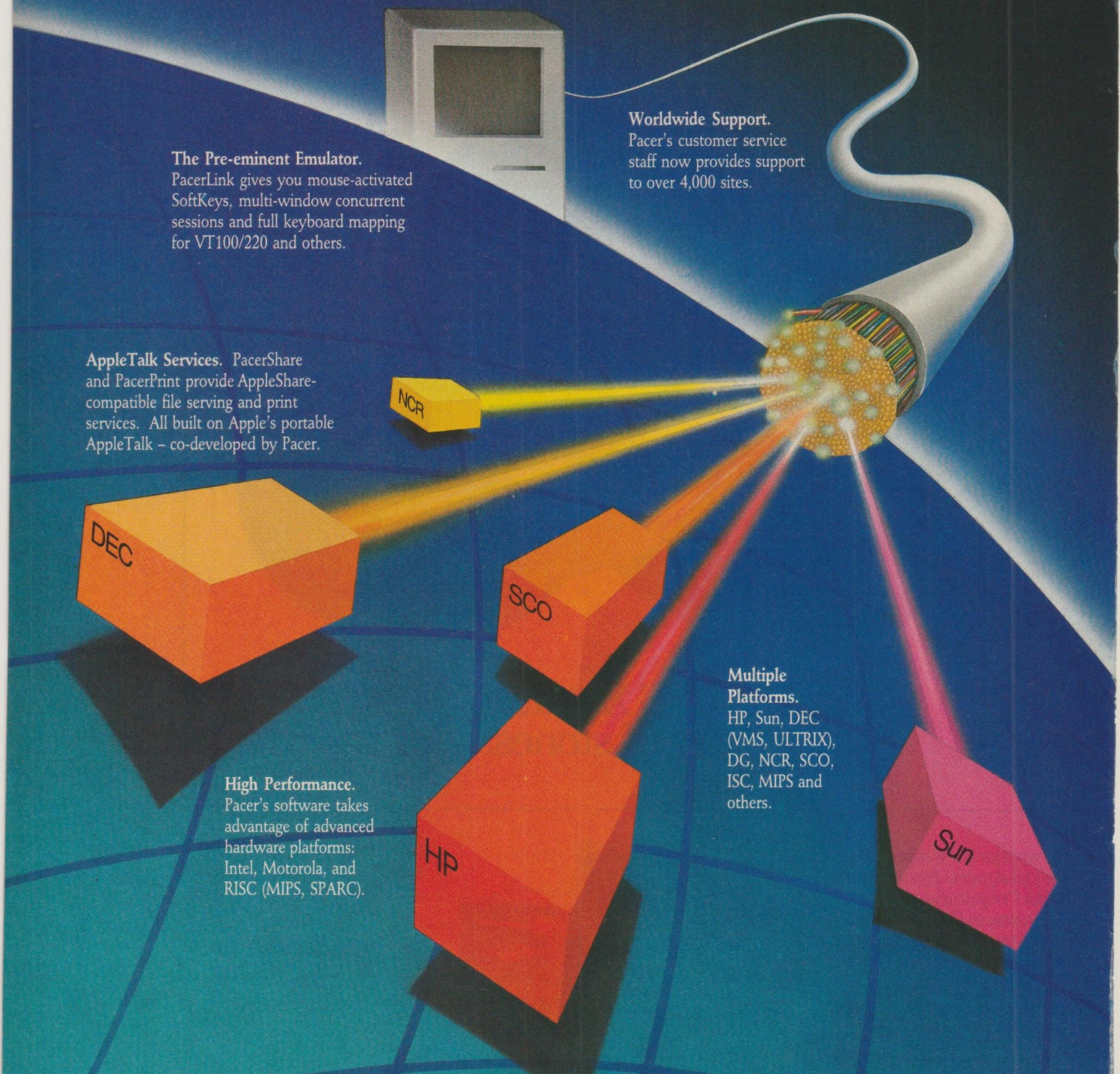

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CIRCLE NO. 192 ON INQUIRY CARD

A Workstation for the Lap

By Rik Farrow

The BriteLite offers workstation power, and DOS and Mac compatibility, but has shortcomings

A new page has been added to the laptop workstation market with the introduction of RDI Computer's battery-powered BriteLite. The BriteLite contains a Sun Microsystems IPC system board, runs SunOS, and offers DOS and Apple Macintosh emulation. And because the BriteLite *is* a Sun compatible, it can potentially run more than 2,000 existing SunView and Open Look applications–about 1,650 more than the Sony News 3250 portable (see March 1991 *UNIXWORLD*).

The problem is that RDI is an untried company with an equally untried screen technology. The best we could get from RDI was a VGA-resolution screen, which makes running many of the SunOS applications impractical or impossible. The good news is RDI was planning to start shipping BriteLites with workstation-class screens (1152-by-900 resolution) by August. The bad news is that we found RDI officials unreliable in their comments on products and order backlogs.

Weighing in at about 16 pounds, the BriteLite is lighter than the Sony portable, but heavier and more expensive than a 386 PC laptop outfitted for UNIX. You could buy the top-of-the-line Toshiba laptop and install The Santa Cruz Operation's Open Desktop on it for around $7,000–almost $3,000 less than the BriteLite's $9,995 list price. But both the BriteLite and the Sony News laptops have something 386 laptops cannot offer–about four times as much workstation performance. These RISC laptops also offer workstation features such as built-in high-resolution graphics, Ethernet for networking, and high-performance SCSI for mass storage.

The BriteLite's most unique trait is that it can simultaneously run three operating systems. In addition to SunOS 4.1.1, you can use Insignia Solutions' SoftPC to run MS-DOS software and RDI's Companion to run Apple Macintosh software. The Companion add-in card, with ROMs cannibalized from Macintosh Classics, can be slipped into any BriteLite, SPARCstation, or SPARC clone. Companion uses emulation software based on the Motorola 68000-based Classic Mac and displays Mac programs in a SunView window, Sun's older windowing system. The product is expensive at $1,995. Additionally, at

RDI Computer's BriteLite laptop can simultaneously run three operating systems and potentially more than 2,000 SunView and Open Look applications.

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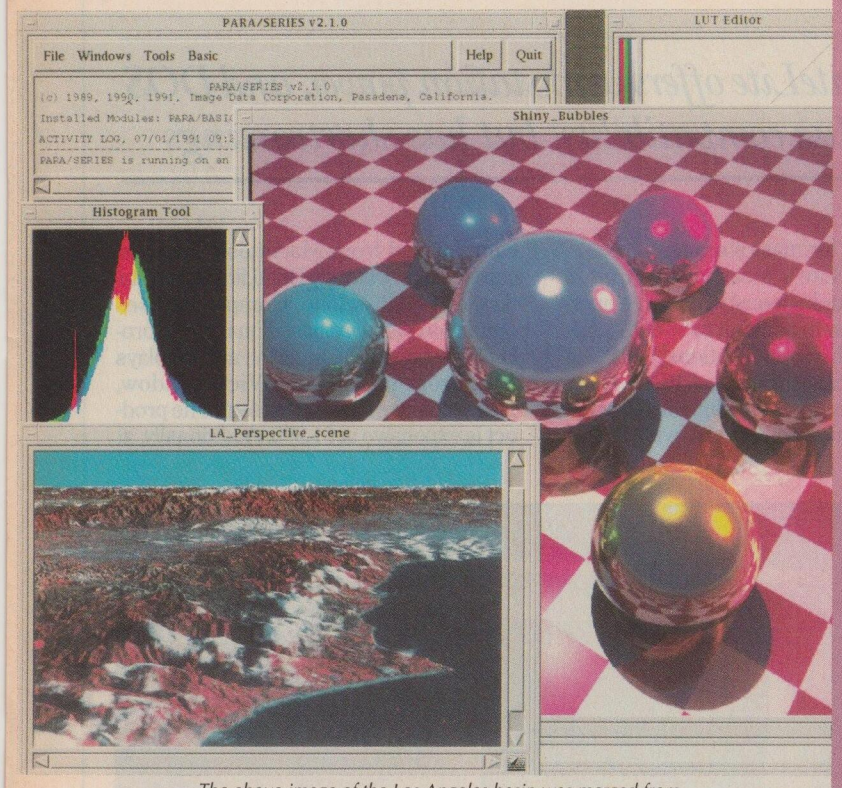

The above image of the Los Angeles basin was merged from Landsat satellite data and USGS terrain elevation data on Silicon Graphics' 4D/240 system. It took 128MB of main memory and 2GB of disk storage.

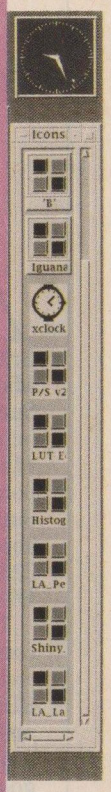

Photo courtesy of Image Data Corporation, Pasadena, California. 818-796-9155

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CIRCLE NO. 241 ON INQUIRY CARD

publication time, Companion developer Xcelerated Systems of San Diego, Calif., had obtained a temporary restraining order prohibiting RDI from selling Companion because of alleged copyright and trade secret infringement.

RDI has garnered some important benefits by using a Sun IPC board. A Sun IPC fits between the SPARCstation 1 and the SPARCstation 2 in performance. It's a SPARC 1+. The Sun IPC and the BriteLite run at 25 MHz, giving them better performance than TriGem's competing SPARCstation clone and laptop, which run at 20 MHz, but less performance than the Sony News laptop. Because RDI is a SPARC-based laptop, Sun permits its sale through its Sun's many value-added reseller and sales channels. The BriteLite is also available through UNIX distributors such as Andataco and Parity Systems.

The BriteLite can do something that neither the Sony nor the TriGem laptops do. The BriteLite can be used as a Sun IPC. A Sun-4 keyboard can be plugged in, and a monochrome monitor connected to the IPC board, turning the BriteLite into a replica of a Sun IPC. When the BriteLite sits in your office, it can be used as a standard workstation with full-size screen and keyboard. And when you leave the office, it's a portable. The Sony we reviewed last March did not have this feature, but now Sony says it will ship a $1,150 add-on board to drive VGA and higher resolution color monitors simultaneously with its built-in LCD display.

Using a full-size monitor with a laptop is crucial, because the BriteLite's $9,995 base price only gets you a 640-by-480 VGA resolution screen. There is an optional 1152-by-900 resolution display (standard Sun size), which gives it better resolution than the $9,900 Sony News 3250, which has 1120-by-780 resolution. RDI planned to ship the 1152-by-900 resolution version of BriteLite by the end of July.

Based on respective SPECmark ratings of 10 and 11.3, the BriteLite falls short of the Sony in performance. If you compare the BriteLite's price, performance, disk, and standard 640-by-480 screen against the Sony, the Sony News wins handsomely. If you add in software availability, and BriteLite's built-in monochrome frame buffer, almost full size keyboard, and SunOS, RDI may find some people willing to pay a little more to get what they want: a portable Sun that is not a clone.

Get a Handle on it

The BriteLite is assembled in the United States by RDI, a start-up founded by three entrepreneurs in San Diego, Calif. RDI relies on Korean computer manufacturer TriGem to manufacture most of the BriteLite, beyond the Sun-made IPC board. TriGem also manufactures an LSI Logic SPARC-based laptop and desktop clone, but these operate at a slower clock speed of 20 instead of 25 MHz, and offer SPARCstation 1 performance compared to BriteLite's SPARCstation 1+ performance.

RDI says the BriteLite weighs only 13 1/2 pounds, but our scales show it to be closer to 16 1/2 pounds, similar to the 17-pound Sony. The BriteLite includes a rechargeable nickle-cadmium battery capable of operating the system for up to two hours. In my test, I started hearing the low battery warning beep after an hour and 50 minutes. The beep means you still have 15 minutes.

You can operate the BriteLite without batteries using the power supply, a small unit that automatically adapts to 50 or 60 cycle and 120-240 volts to work in different countries. The batteries can be completely recharged in three hours when the BriteLite is off, or in 12 hours with the system running. With batteries charged, you can unplug the external power supply and move the BriteLite without powering it down. Although I wouldn't recommend rough treatment, the BriteLite survived being moved while operating. RDI also sells an adapter that plugs into a car cigarette lighter for running off a car battery.

According to RDI representatives, you can put the BriteLite through a correctly functioning airport X-ray without damaging information stored on disks. While I tend to believe them, I still handed the BriteLite past the X-ray. It takes over 10 seconds before something appears on

DOS Emulation: A Talking Dog?

Who cares if the dog slurs his words and talks slowly? The miracle is that he talks at all. So it is with SoftPC.

SoftPC works on standard SPARC and Next hardware to emulate a PC AT equipped with a 286 processor, 80287 math coprocessor, two serial ports and two parallel ports. It can emulate EGA, CGA, and Hercules display adapters, and provides up to 32 megabytes of expanded memory.

As a means to run an occasional piece of DOS software without dedicating a spot on top of your already crowded desk to a PC, SoftPC is a workable solution. At $695, though, if you have room, buy a standalone PC.

Unless SoftPC is the only user-program running on a SPARC clone, performance varies between slow-as-molasses and glacially slow. Further, on the BriteLite portable SPARCstation from RDI, the cursor keys are awkward to use on certain programs.

I tried to use the ubiquitous Norton Utilities `sysinfo` command to measure the performance of SoftPC on a Tatung SPARC Workstation, but version 5.0 of the command would not run and failed with an internal error. Version 4.5 ran, but always returned a figure of merit of about 3.0 (3 times the speed of a 4.77-MHz XT), even when the system was loaded heavily enough that the command took 50 times as long as normal to execute.

OK, SoftPC is slow, but does it work? Except for the cursor-key problems on the BriteLite and the failure to run the `sysinfo` program from Norton Utilities Version 5.0, SoftPC ran everything I threw at it.

For my initial testing, I used Act!, a database-intensive contact manager program from Contact Software International. Act! is a text mode program that uses a full-screen interface, with frequent disk access. Under Motif, with no other processes active, Act! had acceptable performance. As soon as I began to compile a program or format a file with `nroff`, Act! slowed so much that I found myself looking out the window and waiting for the background operation to finish. There is no way that I'd consider keeping Act! running in a SoftPC window.

As an acid test of DOS compatibility, I installed Microsoft Windows 3.0 directly into the SunOS file system using SoftPC's File Sharing Architecture (FSA). The installation procedure was uneventful; Windows recognized SoftPC's "synthetic hardware" including the EGA emulation.

All of the standard Windows programs ran, but slowly, as I expected. I tried to play the Windows Solitaire game long enough to beat it so that I could see the bouncing-card display at the end. I gave up in disgust after one game. If you ever want to see just how much work it is to program a game like Solitaire, run it under SoftPC and watch as each pixel of the graphics display is drawn one by one.

I'd like to give SoftPC good marks, but I think your money would be better spent on a standalone PC. With no other programs running, SoftPC can provide acceptable PC AT emulation–but then you've turned your expensive workstation into a $700 AT-clone.

–Editor-at-Large Rick Farris

the screen. Airport security personnel seem to like to see something on the screen so that they can tell you are not foolish enough to waste a $10,800 workstation as a tool of terrorism. That 10-second wait seemed like forever.

Ergonomic Flair

The keyboard features all 103 keys found on a Sun-4 keyboard in a slightly altered layout. To accommodate the function keys–a Sun-4 keyboard has 37 function keys–the left and right keypads have been moved into two horizontal arrays across the top of the keyboard.

The BriteLite also comes with a three-button, mechanical mouse. A Sun-style optical mouse would be a real nuisance with a laptop because of the base grid you must use. When I was working with the BriteLite in unusual circumstances, like on my hotel bed or the back deck of my house, I wanted a trackball instead. Still, the mouse worked well.

I didn't like the BriteLite's VGA screen. An RDI representative tried to show me the bright side (Brite side?) of the 640-by-480 pixel resolution by saying that if it had higher resolution, the fonts would appear smaller because of the smaller pixels. I'd prefer smaller fonts and more resolution, thank you. The default display is a super-twist LCD, with adjustable backlighting, 9 3/8 inches diagonally. When it becomes available, the optional 1152-by-900 pixel screen, will measure 11 1/2 inches on the diagonal and costs $1,200 to upgrade from the VGA screen. For this review, RDI provided a handy Open Look tool that lets you move the 640-by-480 display around different regions of the 1152-by-900 virtual display in the frame buffer. The virtual display is always resident, so moving it is fast, but not as convenient as seeing the entire 1152-by-900 screen.

Sun is Inside

The BriteLite has a cover that protects the connectors on the back panel. These are the standard connectors found on the Sun IPC and most SPARCstations: DIN-8 connectors for audio, mouse/keyboard, and two serial ports; a SCSI-2 port; and a DB-15 for Ethernet. Because this is an

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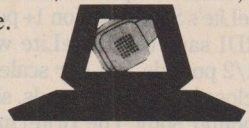

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Review Highlights

CONTACT INFO

BriteLite Laptop
RDI Computer Corp.
6815 Flanders Dr.
San Diego, CA 92121
619-558-6985

⊕ A battery-powered laptop with total Sun SPARCstation compatibility. Good performance. Support for external keyboard and monitor. DOS and Apple Macintosh compatibility.

⊖ Default display resolution is only 640-by-480, hard disk is small and keyboard hard to use when the BriteLite is used on the desktop.

PRICE $9,995 for base system, with eight megabytes of RAM, 120-megabyte hard disk, 640-by-480 display, batteries, mouse, power supply, and SunOS 4.1.1 $1,200 to add larger 1152-by-900 pixel display.

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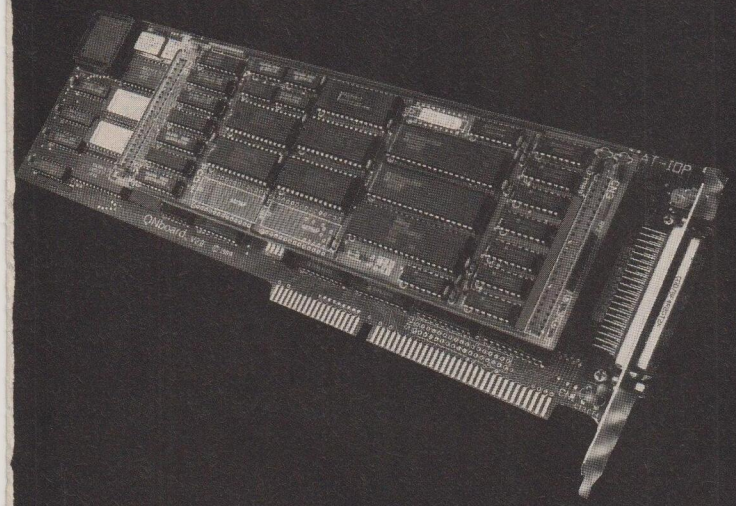

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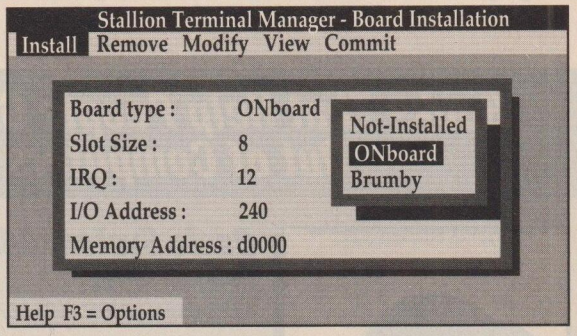

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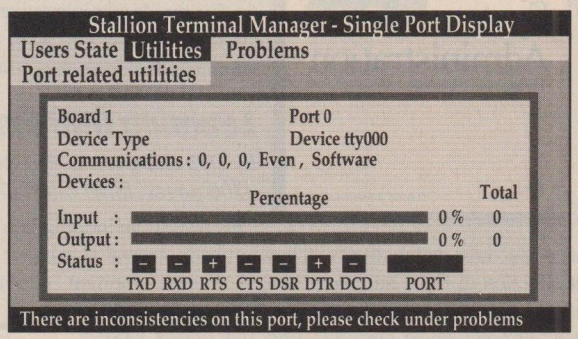

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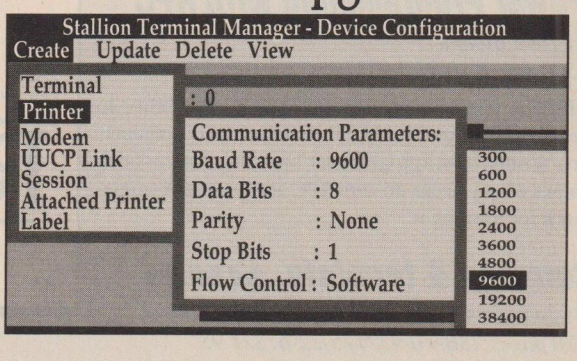

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IPC, there are also two SBus slots and an external video connector for a monochrome display. By plugging in a display using a Sun J13W cable and monitor, the BriteLite will use the monitor as well as the LCD screen.

Although the documentation warns against opening the BriteLite, I forged ahead anyway. It turns out to be simple enough, just remove six screws and the cable that connects the keyboard to the motherboard. At the front of the case is a 3 1/2-inch diskette drive on the right and a 3 1/2-inch, 120-megabyte hard drive on the left. The power supply is along the right edge, and the batteries sit in the rear. The BriteLite is somewhat better balanced than the Sony, which places its heavier components in the back. The BriteLite is also back heavy, but useable. I actually set it on my lap and worked about a half hour.

Diskless BriteLites

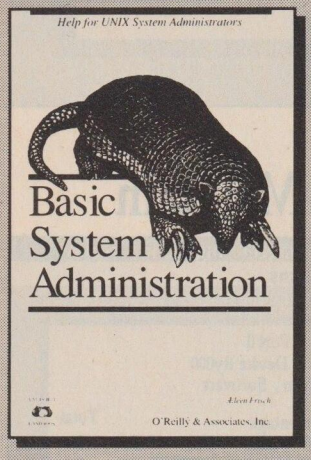
RDI has sold some diskless BriteLites as portable workstations in a networked environment. The BriteLite hard disk comes with SunOS pre-installed. Further installation is identical to that on a Sun workstation–just answer questions about host names and time zone, and installation is complete. RDI's documentation is minimal, a thin booklet describing installation, booting, and use of the BriteLite. Although online documentation was included, I suggest that you buy the SunOS 4.1 documentation for $995. [*Editor's Note: RDI said at publication time that it would begin shipping Sun manuals with the BriteLite.*]

The BriteLite's 120-megabyte hard disk is somewhat of a problem if you expect to carry volumes of data with you. The reviewed system included both SunView and Open Look, along with Open Look demos, online manuals, UNIX System V utilities in `/usr/5bin`, and the C compiler. Surprisingly enough, there were 14 megabytes of free space available, and you could reclaim more by removing one of the windowing systems and the demos. Still, 120 megabytes is only half what Sony offers with the News 3250.

UNIX laptop workstations belong in the realm of the professional–consultants working on-site, salespeople of Sun software, and the like. Other laptops will show up where workstation performance and graphics are required, and transporting a full-size workstation would be a problem. As an example, many factories, warehouses, and power plants have process control and monitoring stations that use workstations to display information for operators, supervisors, and engineers. A laptop workstation would fit right into such an environment, tapping into the network wherever needed. The BriteLite can also be used in the field because it is battery-powered and can run off car batteries.

The BriteLite could become a popular portable. Running true SunOS on a Sun motherboard, it does not lack software or connectivity. Because it can be connected to a regular Sun-4 keyboard and a large monochrome monitor, it has all the power of a SPARCstation 1+ and none of the disadvantages of a laptop when used in your home office. While it's not a notebook computer (does anyone really want calculator-size UNIX?), its weight is not unreasonable. But if you want one for your lap, get the high resolution screen, if it's available. And if it's not, you might as well buy a PC laptop or a Sony. ■

Books That Help People Get More Out of Computers



Basic System Administration

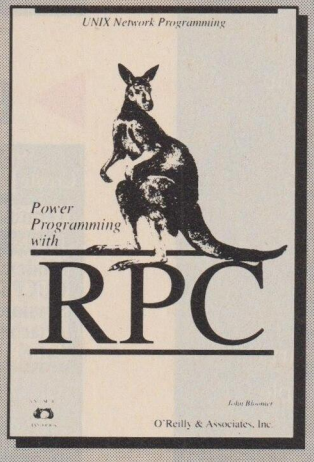
By Æleen Frisch
~325 pages, ISBN 0-937175-74-9, $24.95

Basic System Administration provides a compact, manageable introduction to the tasks that everyone responsible for a UNIX system faces. This guide is for those who use a standalone UNIX system, those who routinely provide administrative support for a larger shared system, or those who want an understanding of basic administrative functions, on all major versions of UNIX.

Learning GNU Emacs

By Deb Cameron & Bill Rosenblatt
~300 pages, ISBN 0-937175-84-6, $24.95

This book is an introduction to the GNU Emacs editor, one of the most widely used and powerful editors available under UNIX. It provides a solid introduction to basic editing, a look at several important "editing modes" (special Emacs features for editing specific types of documents), and a brief introduction to customization and Emacs LISP programming. The book is aimed at new Emacs users, whether or not they are programmers.



Power Programming with RPC

By John Bloomer
~500 pages, ISBN 0-937175-77-3, $29.95

RPC, or remote procedure calling, is the ability to distribute the execution of functions on remote computers. Written from a programmer's perspective, this book shows what you can do with RPC and presents a framework for learning it.

termcap & terminfo, 3rd Edition

By John Strang, Linda Mui, & Tim O'Reilly
270 pages, ISBN 0-937175-22-6, $21.95

For UNIX system administrators and programmers. This handbook provides information on writing and debugging terminal descriptions, as well as terminal initialization, for the two UNIX terminal databases.

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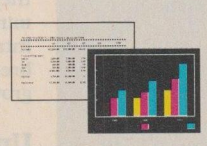

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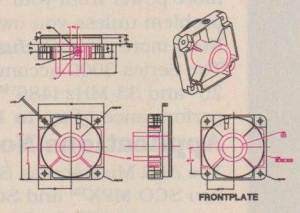

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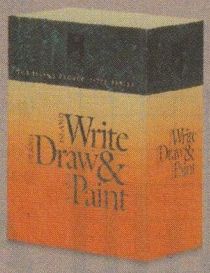

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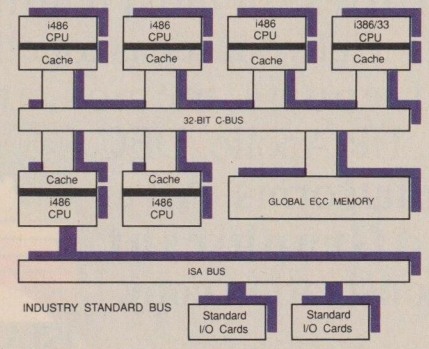
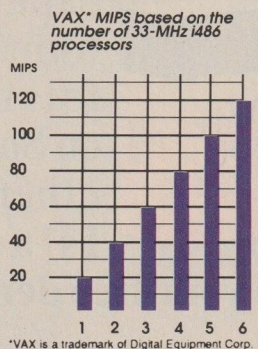


MultiAccess Series 3000 System Architecture



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CIRCLE NO. 14 ON INQUIRY CARD

Not Ready For Prime Time

By Mike Burgard

SCO's Microsoft Word is not Motif compliant, nor is it the answer to the Windows version

Microsoft Word 5.1 is the first word processor of note to run natively under Open Desktop, The Santa Cruz Operation's packaging of the X Window System and Motif. First to run, however, does not mean finished.

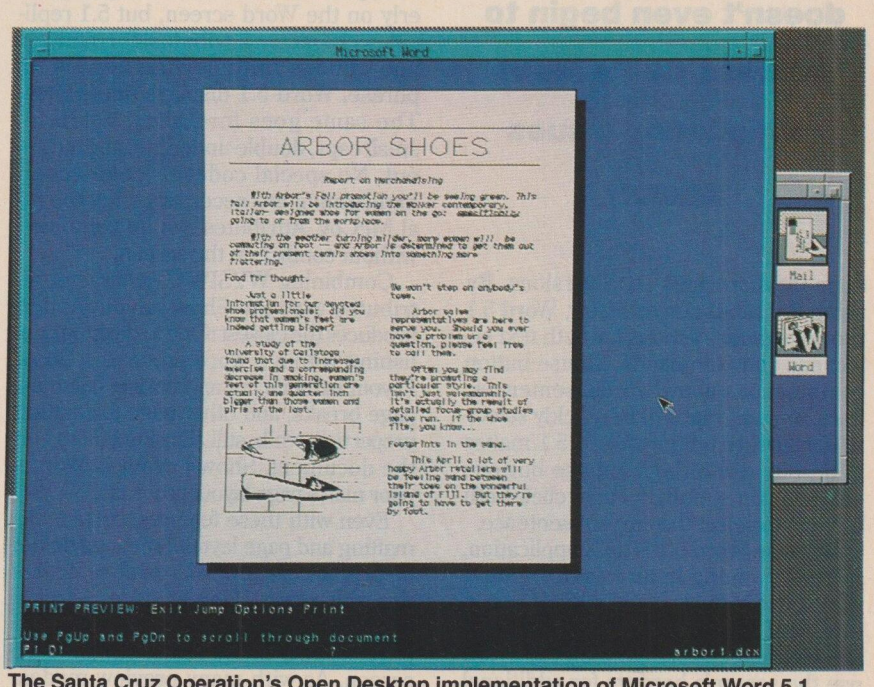
The current state of Word 5.1 indicates that either Microsoft doesn't know much about Motif or SCO wanted to rush the product to market. Word 5.1 is so anemic that it doesn't even meet the criteria for a Motif-compliant application. It will surely disappoint anyone expecting an equivalent to the DOS version of Word for Microsoft Windows.

Although it runs under Open Desktop, Word 5.1 is still a character-based word processor that doesn't come close to taking full advantage of Motif or X Windows. Traditional graphical user interface (GUI) concepts such as adjustable fonts, hot-linked graphics, and WYSIWYG views are absent in Word 5.1. It does make sense to upgrade to or buy Word 5.1 in a couple of situations, however. If you are using Word 5.0 with more than ten users, SCO states the performance has improved considerably. Additionally, Word 5.0 users looking for print preview and mouse support will find these in 5.1. However, Word 5.1 is not likely to attract DOS users nor will X users find much of interest in Word 5.1.

Word 5.1 provides the same set of features as Word 5.0 in DOS. When Microsoft released 5.0 in 1989, SCO followed quickly with a UNIX version that lacked several of the snazzy features found in the DOS version. The new UNIX release addresses this disparity, but 5.1 still lags behind the latest DOS release, Word 5.5, as well as Word for Microsoft Windows, familiarly known as WinWord.

Major feature additions in Word 5.1 include full mouse support, print preview, color support, and on-screen underlining, italics, and boldface. SCO sells Word 5.1 for all its 386 platforms, including its XENIX and UNIX character-based environments, but mouse support is the only new feature that works under these. Coming when it does–SCO originally promised the features would be incorporated into Word by the end of 1990–mouse support is a mere token for true UNIX aficionados of Word. In its defense, SCO might be having trouble convincing Microsoft to port the better versions of Word to UNIX. "SCO is committed to bringing a complete WYSIWYG word processor to the UNIX market soon and is in the process of negotiating with Microsoft concerning the rights to Word for Windows...but [the negotiations] are going slow on the Microsoft end," according to Jim Bahn, SCO's Word product manager.

Word 5.1 was tested under SCO's



The Santa Cruz Operation's Open Desktop implementation of Microsoft Word 5.1 exhibits page formatting properties and WYSIWYG character attributes.

Open Desktop 1.1 running on an AT&T WGS 6386/25, with eight megabytes of RAM. A 19-inch VGA monitor and a Paradise Graphics card made up the video aspects of the system. No other users were running under Open Desktop, although I ran Word with various multiscreens via SCO's multiple logins. The product was definitely a snap to install. A script executed through the `custom` command eliminated all possible snags. Any number of printer drivers can be loaded, but there is no reason to choose more than currently necessary, because additional drivers can be installed at a later date.

A Mouse Without Style

As an X Window application, Word implements the X server-client relationship in a technically correct manner. But as a Motif application, it doesn't even begin to address compliancy issues set forth by the Open Software Foundation in its "Level One Certification Checklist." In fact, Word 5.1 ignores most of the 154 items in the checklist, including some of the more fundamental ones.

Even in the area of mouse support, the most improved area in Word 5.1, the Motif checklist is ignored. Despite this, methods of manipulating the mouse are straightforward, modeled on how it is done in Microsoft's DOS versions. By using the Motif cursor arrow, Word 5.1 provides mouse actions for both text selections and commands. Mouse button combinations allow words, sentences, lines, or paragraphs to be quickly selected for further editing. Word 5.1 makes generous use of both mouse buttons and lets you simultaneously click both buttons to select the current sentence.

Word 5.1 doesn't even begin to address OSF's Motif compliancy issues

Because Word 5.1 is an X application, not just running in an `xterm` window, the mouse is fully active in Word and in the Motif window. The problem is that the character-based versions of Word use the screen's borders for additional mouse actions. For example, clicking on the right-hand border of Word splits the screen into two windows. But under Motif, if you click just a hair too far to the right, you invoke the X.desktop desktop manager, which comes bundled with Open Desktop.

In theory, all of Word's commands respond to mouse actions. Simply point at a command on the menu and click. If the command has selectable options, they are selected by clicking with the left mouse button. If a list exists with the names of available files, the right mouse button brings up the list.

In practice, the mouse is too cumbersome for many commands. Without the drag mode of pull-down menus, it is too easy to select the wrong command or option. Commands with limited options–Transfer and Library, for example–are best suited for the mouse. Here again, releasing a character-based product for Motif leaves the user grasping at metaphors to express frustration. Trying to ease users into using the mouse is a mistake. Most people will ignore the mouse for command actions because the keyboard is much easier.

Beyond command selection, other uses of the mouse include scrolling through the document, setting tabs, and expanding and collapsing outlines. Outlining particularly lends itself to strong mouse use because everything is thought of in terms of a block or phrase. Mouse support extends to serial terminals and non X-environments.

Mimicking Page Layout

Multiple fonts sizes do not display properly on the Word screen, but 5.1 replicates character attributes correctly. If you choose to underline a word or phrase, Word 5.1 displays underlines. The same goes for italics, boldface, small caps, double underline, and strikeout. No special codes or color-coded highlighting are necessary–only the real McCoy. Attributes can be combined without conflict on the screen.

Combining WYSIWYG character attributes with the Show Layout option produces the closest thing to desktop publishing within a word processor. Show Layout exhibits the appropriate columns, page breaks, and other page formatting properties, while still allowing you to edit the document. Show Layout is Word's poor man's page layout program.

Even with these features, certain formatting and page layout functions do not display accurately. Microsoft remedies this with a Print Preview mode. Selected from the Print menu, one or two simulated pages appear in the center of the Word screen. As with many preview modes, you can neither read nor edit the text, but columns, tables, page breaks, and general formatting are clearly displayed. Print Preview is designed as a paper and time saver, showing you how a document will look before it is actually printed.

For production page layout work, Word 5.1 is inadequate when compared to true page layout software like FrameMaker or Pagemaker. While you can edit in the Show Layout mode, detailed layout schemes are slow and difficult to work with. For common office work, a combination of Word's Preview mode and the Show Layout command produces high-quality documents, but anyone looking for true page layout software will not find it in Word 5.1.

But it has Good Color

An aesthetic change is complete color palette control for the user of Word 5.1 under Open Desktop. Selecting the Options Color command delivers a help screen to control the color of background, borders, and commands. Selecting a color is a matter of highlighting an element and then paging through the 14 colors in the palette.

Changes mentioned up to this point, other than mouse support, are only available when running Word as an X cli-

Review Highlights

CONTACT INFO	**Microsoft Word** *The Santa Cruz Operation.* 400 Encinal St. P.O. Box 1900 Santa Cruz, CA 95061 408-425-7222 `uunet!sco!info` or `info@sco.com`
⊕	Runs under X Windows. Extensive mouse support, visible character attributes, and print preview mode. Full-featured word processor.
⊖	No attempt to be Motif-compliant. Not a graphical word processor. Still using the dated Word menu bar. No significant word processing features added.
VERSION	5.1
SYSTEMS	SCO UNIX 3.2, XENIX, and Open Desktop; AT&T UNIX V 5.3
LICENSING	Per CPU.
PRICE	$495 single-user license; $995 unlimited user license.
SUPPORT	9 a.m. to 8 p.m. (EST), toll free line. After an initial 30 days of free support, contract support is available. Quarterly newsletter.
WARRANTY	90 days on media.

ent within Open Desktop or XSight, SCO's standalone X Window environment. Minor changes that extend to all Word versions include file transfer additions and printer drivers.

Making up for past sins of omission, SCO has added three file conversion programs to Word 5.1. SCO's own Lyrix files can be converted to Word binary format via a standalone program, through the SCO portfolio clipboard, or via a Word macro. Beyond Lyrix, Word 5.1 converts back and forth between IBM Document Content Architecture (DCA), Microsoft's Rich Text Format (RTF), and Word's binary format. Both

It may have been better to release Word 5.1 as a minor upgrade

DCA and RTF have standalone conversion programs and Word macros.

SCO has also extended Word's printer driver repertoire to include Hewlett-Packard Series IIP, III, and IIID. Word supports the multiple tray, auto rotation, and landscape features of one or more of these HP LaserJets. Further printer support is added for the IBM Page Printer, Canon Bubble Jet, new Epsons, in addition to several other printers.

The primary additions to the documentation are a feature supplement, a new installation manual, and a well done tutorial. The main documentation has not been altered. The excellent on-line tutorial in the DOS version is still absent from the UNIX version.

SCO's decision to bring a non-Motif compliant word processor to Open Desktop is questionable. It may have been better to quietly release Word 5.1 as a minor upgrade and wait. No one questions Word's feature suite and its fit in the office environment, but let's not be so naive to say it is a standard Motif application or even a reasonable graphical application. ■

Editor-at-Large Mike Burgard is a regular reviewer for UNIXWORLD *and a data systems information manager for a commercial printing company in Montana.*

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CIRCLE NO. 253 ON INQUIRY CARD

Update by Frank Hayes

VENDORS WILLING TO COOPERATE ON OBJECT STANDARDS

Has cooperation replaced competition as the hallmark of vendor-group standards? You might think so watching the selection process for the Object Management Group's (OMG's) "object request broker" (ORB) this past spring.

The surprises began when workstation rivals Sun Microsystems and Hewlett-Packard announced their submission of a joint entry. Then merger mania ensued: Digital Equipment Corp. announced it was merging its proposal with that of HyperDesk. HP and Sun then combined their proposal with a joint submission from NCR and Object Design. Finally, DEC and HyperDesk merged their proposal with the HP/Sun/NCR/Object Design submission.

When the dust settled, there was no choice left to make for the OMG's technical committee. The only entry was the single proposal supported by DEC, HP, Sun, HyperDesk, Object Design, and NCR (which by this time was part of AT&T).

This kind of rampant cooperation among otherwise implacable foes would usually sound impossible. Somehow, though, it doesn't seem out of place in the baffling world of objects.

Ask a vendor or programmer immersed in object-oriented technology for the definition of "object" and you're likely to get an explanation sprinkled with jargon terms like "classes," "inheritance," "instantiation," and "encapsulation." Jargon aside, one simple answer is that an object is a software "black box." A black box is a self-contained device that has a well-defined function, but what's inside it is not necessarily known. More important, you don't have to know what's inside the black box to use it.

The Concept of the Black Box

A familiar non-computer example of a black box is the brake system on an automobile. You may not know anything about how the brakes work or their technical details–whether they're power brakes or whether they use disks or drums to stop the car. You *do* know that when you press the brake pedal with your foot, the car will slow down. As long as you know how to work the brake pedal, you can use the brakes without knowing what's inside the black box. In fact, if someone replaced your brakes with a completely different technology, you'd still be able to use them as long as the black box worked the same way.

An automobile consists of a collection of black boxes, as do computer systems–at least at the hardware level. That's what makes it possible to use standardized peripherals and plug-in boards, and to mix and match parts from many vendors. Interconnection standards depend on the fact that the devices they connect will act as black boxes.

For the most part, though, computer software doesn't fit the black-box mold. A software application is usually designed as a single, unitary system in which each part depends on the way other parts work internally. As a result, software is hard to build, and once built it's even harder to change. With so many parts depending heavily on so many other parts, complexity skyrockets as applications get bigger. Any change to one part of the software can have unintended side effects that affect the way another part works.

Jargon aside, a simple definition is that an object is a "black box"

The problems involved in making such changes are painfully familiar to managers of large mainframe systems on which huge, decades-old applications require plenty of care for every modification. The difficulties of side effects are also becoming clear to independent software vendors that are having an increasingly hard time debugging their ever-larger applications.

To solve this problem, software designers are turning to the black-box approach in the form of object-oriented languages and systems. At the lowest level, programmers can use languages such as C++ to make it easier to write software composed of small black-box functions. On a larger scale, the black-box concept can be extended to things outside an application, such as databases, word processing documents, and spreadsheet files.

In conventional programming, a programmer who needs to see the contents of a file writes a routine to open the file and read the appropriate data. This approach requires knowing the internal structure of the file. With an object-oriented approach, though, the file is a black box, and the programmer has no way of knowing the inside structure. Instead of a file-reading routine, the programmer writes a routine that sends a message to the file, asking for the appropriate data. In turn, the file replies with the requested information.

The obvious advantage for programmers is simplicity; the programmer doesn't need to know the internal structure of the file. An added bonus is that, because the programmer no longer depends on knowing the file's structure, its structure can be changed and the routine will still work without modification. The routine will also work with other files that have different structures, as long as they all understand the same messages. Files, or other objects, can even come from different vendors.

Like peripherals and boards, software objects can be swapped or upgraded, or even replaced by equivalent objects from a different vendor with better performance or more capabilities. As long as the objects can communicate in a standard way, they can work as interchangeable parts.

continued

Getting Boxes to Talk

There's more to object technology than communication between black boxes. However, much of the confusing object jargon concerns the internal details of objects. For example, *instantiation* refers to multiple versions of the same black box. A *class* is a group of similar black boxes, all of which follow the same set of rules. *Inheritance* means that changing one black box in a class can affect black boxes derived from it.

Still, the biggest barrier to the success of multivendor object systems concerns getting all the black boxes from different vendors to communicate among themselves–and getting them to communicate with the vast majority of existing applications, which *aren't* object-oriented. These are the problems OMG was formed to solve.

The answer, according to OMG, is for all vendors of object-oriented software to agree to a standard way of communication. It doesn't have to be an all-encompassing standard that specifies the fine details of every sort of object–that would be impossibly complex. Even if it weren't, it would certainly be impossible to convince the 150 OMG vendors and corporate users to agree on such a definition. Instead, OMG is trying to develop just enough of a standard–one that specifies the syntax of how objects will communicate, without trying to get into the nuts and bolts of the process.

The key to OMG's "just enough" standard is its "object management architecture," under which any black-box object can send messages to another. The object sending the message doesn't need details about the message's recipient–not how it works, or who made it, or even where it happens to be on the network.

Object Cops and Parole Officers

Specifying message syntax is simple enough. But how can a message get to its recipient when the sender doesn't know the destination? This is the job of "object managers," which are objects that serve as traffic cops for messages among other objects.

Object management can be a more complicated task than it first appears. The traffic-cop objects must not only keep track of where other objects are, but must also make decisions. For example, consider a message to print a document on a printer. Depending on a wide variety of factors, the object manager could send a message to the document, asking it to send itself to the printer. Or it could send the message to the printer, asking it to collect the document and print it. In an object-oriented scheme, either of these options is possible because both the printer and document are objects with their own built-in capabilities.

What about the vast majority of documents, printers, and applications existing now in non-object-oriented systems? Some could eventually be rewritten in object form, but that's not likely for a long time. How can these non-object applications fit into an object context? That's the job of OMG's ORB–the technology that sparked such unexpected consensus among competitors.

If an object manager is like a traffic cop, an ORB is a parole officer for unruly, uncivilized, un-object-oriented applications that must live in an object-oriented computer system. Such an application can be "registered" with an ORB, so that the can keep track of where the application is, handle messages directed to it, and generally make sure that, from the point of view of all the other objects in the system, the application appears to be a well-behaved object. In the jargon of object technology, the ORB "encapsulates" the non-object application, making it behave like an object.

Even with a standard ORB interface, there's plenty of room for fierce competition

The primary difference between a regular object and an ORB-encapsulated application is that the ORB must do a lot more work to make the non-object application appear as an object to the rest of the world. Even with a parole officer, conventional applications can be pretty uncooperative in an object-oriented world.

For example, consider that message to print a document. If the document is an object, the only complication is whether to send the message to the document or the printer. If the document is non-object-oriented, it won't have a clue as to what to do with the object's message. However, if the document is registered with an ORB, the ORB will start the document's word processor, load it with the appropriate file, and issue the correct command to print the document.

What if the message requires a response–for instance, if the request is for the contents of a particular cell in a spreadsheet? The ORB would run the spreadsheet, load the file, and issue a command to export the contents of the appropriate cell. Then the ORB would repackage the exported information into the correct message format and send it as a reply to the object that asked for the information.

If the whole process sounds complicated, it's easy to understand why the ORB submitters were so quick to cooperate by merging their individual proposals into a single entry. The ORB is complex enough without the potential problems of incompatible messages or interfaces. By agreeing to a standard interface, the vendors tore down one of the major roadblocks to object-oriented systems that cross brand-name lines.

Ironically, agreeing to a standard interface didn't cost the ORB vendors their existing products or advantage of maintaining their own ways of doing things. This is a major difference from the way another industry group, the Open Software Foundation (OSF), conducts its "requests for technology." OSF examines the submitted products, then chooses a winner or merges several entries into a final selection. That's good news for the companies who win the competition–their products become instant market leaders. However, the products that don't win instantly become obsolete. Those companies must scramble to replace the competition-losing products with someone else's technology or risk being left behind. That's why OSF's competitions have generated plenty of grumbling–and even a lawsuit by one of the losers.

With OMG's "just enough" approach, there's no winning product, only an interface specification. As a result, the final merged proposal supports each vendor's existing products–as well as its competitors' products. Thus, even with a standard ORB interface that all object vendors agree on, there's plenty of room for the fierce competition you normally expect among DEC, HP, Sun, and NCR. The message interface may be standard, but what's *inside* the black boxes is not. ■

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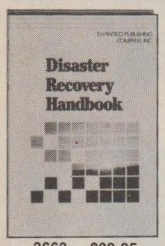

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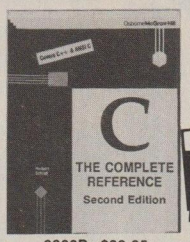

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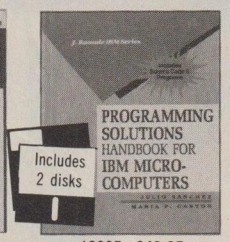

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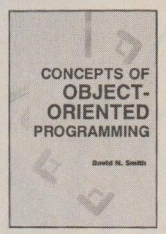

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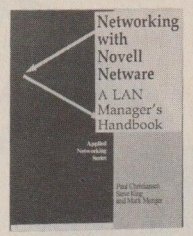

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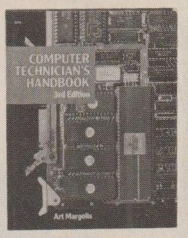

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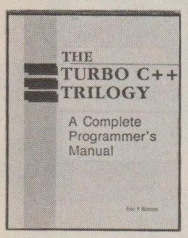

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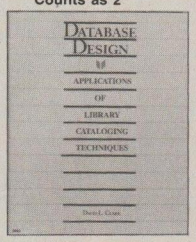

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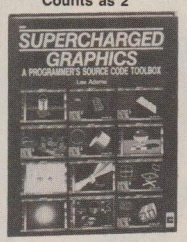

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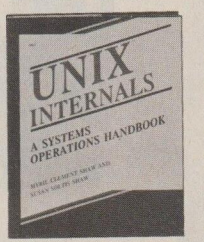

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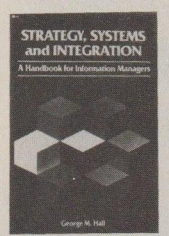

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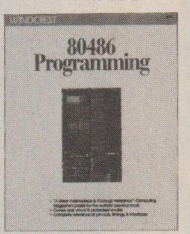

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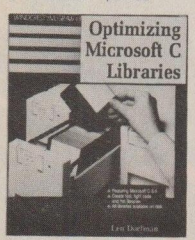

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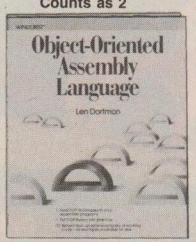

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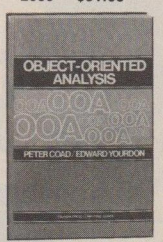

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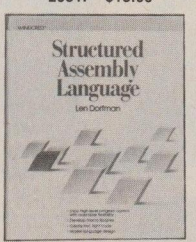

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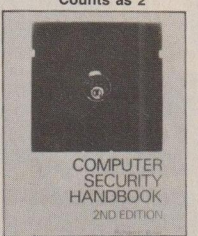

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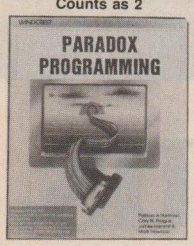

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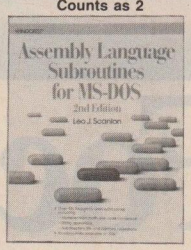

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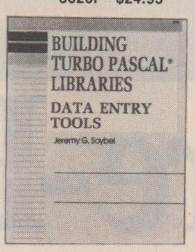

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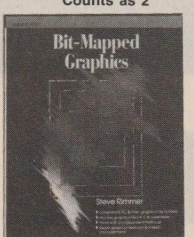

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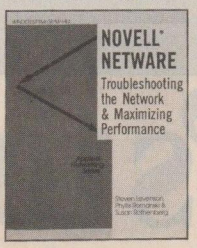

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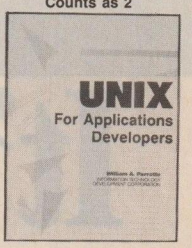

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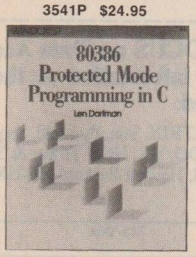

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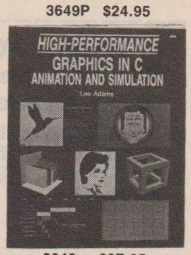

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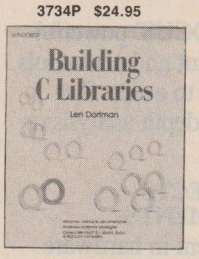

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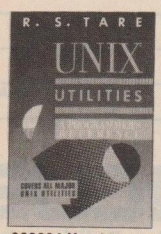

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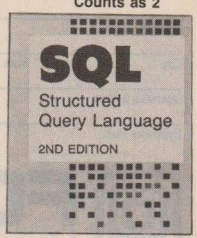

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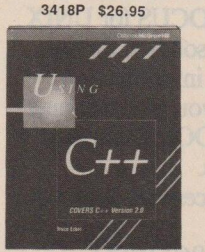

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CIRCLE NO. 41 ON INQUIRY CARD

The Perl of Least Resistance

In the second of a three-part series, learn to use Perl's translators to convert sed *and* awk *scripts.*

By Larry Wall

Larry Wall is a senior scientist at NetLabs, Inc. in San Diego, Calif. He is the author of the Perl programming language and such freely available programs as **rn**, **patch**, **Configure**, and **metaconfig**.

Most people try to avoid persistent pain. There are exceptions, of course, but if you're not one of them, I hope to take a little of the pain out of your life. In this article, we'll look at ways to bootstrap your knowledge of Perl by using what you already know about **sed**, **awk**, and **find**.

Last month, we covered some of the reasons Perl exists: Perl is free, and Perl is familiar. Perl is an experiment in systematizing the relatively undisciplined semantics of the UNIX environment into a classically compiled scripting language. Because of this, you can write extremely portable programs that don't need to be recompiled for different architectures.

Perl has very simple data types: scalar values and arrays of scalar values indexed by number or string. These data types have no arbitrary limitations–you can have strings and arrays as large as you like (or have memory for). Perl has a rich set of operations, but you don't have to know all of them to write useful Perl. You can program Perl like a C, **awk**, **sed**, or shell. You can even program it like a Perl programmer if you want.

Getting There From Here

Along with the Perl distribution come several tools to help you migrate existing code to Perl. The **s2p** program translates **sed** scripts to Perl and the **a2p** program translates **awk**, **nawk**, and **gawk** scripts. The **find2perl** program does just what it says, translates a **find** command to the corresponding Perl program.

There are several reasons you might want to do such a translation:

- If you have an investment in existing code that needs better integration.
- If you want to see how a construct you're familiar with in one of the other languages corresponds its equivalent in Perl.

continued

LISTING 1: This example demonstrates the translation of a sed script to the corresponding Perl program.

A. Here is some sample output from **ls -R**:

```
up:
sidedown
scale

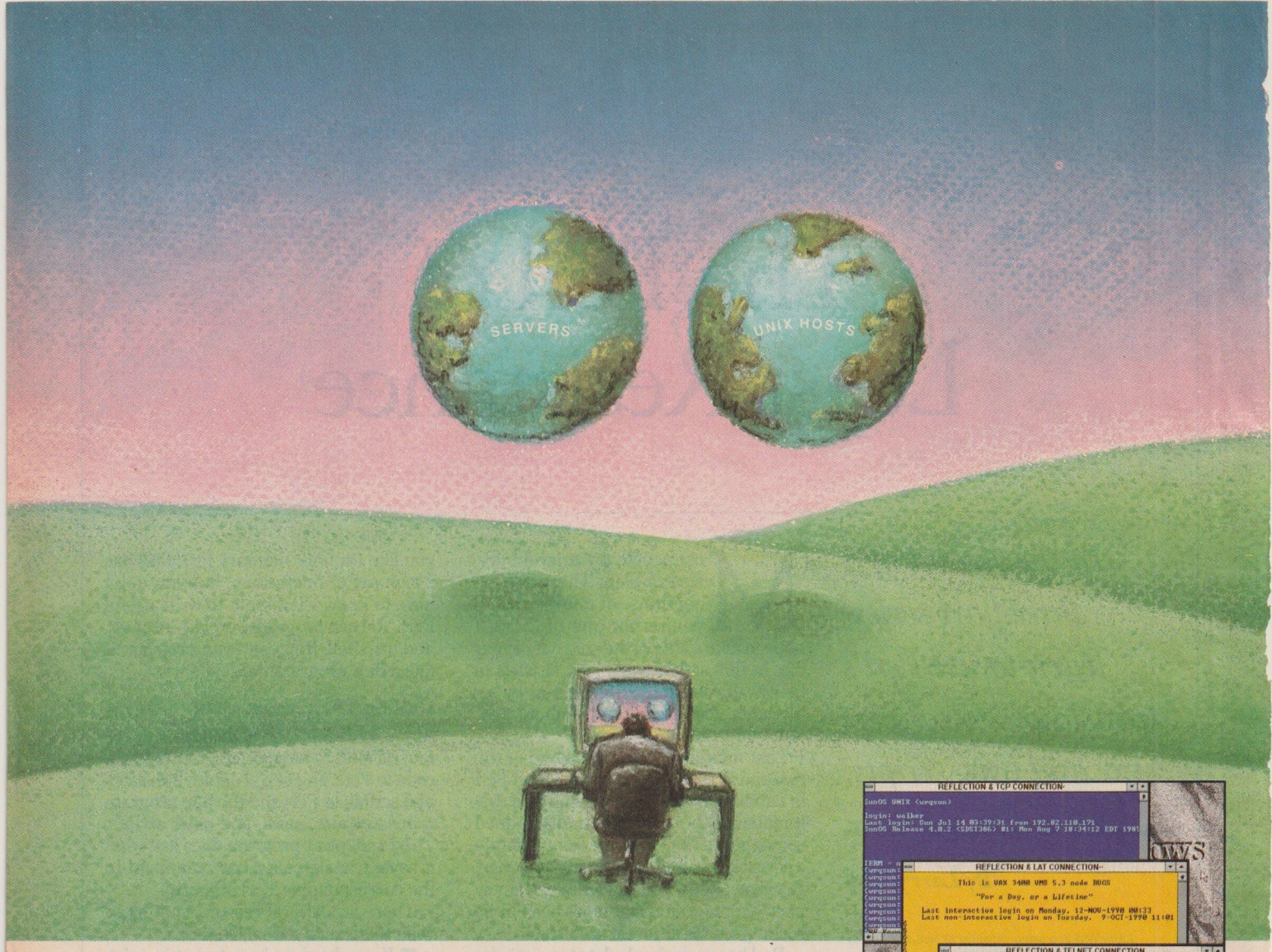
down:
stairs
town

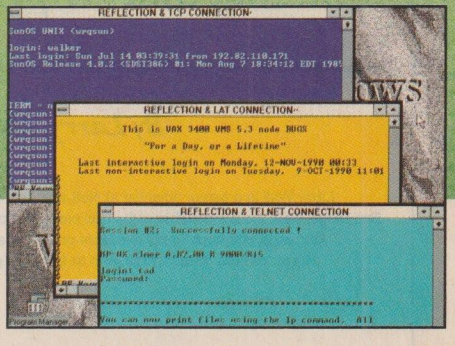
down/in:
front
thedumps
```

B. Here's what we want it to look like:

```
up/sidedown
up/scale
down/stairs
down/town
down/in/front
down/in/thedumps
```

continued





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■ If you need some gadget not provided by the other language that can be easily installed in the translated Perl script.

■ If you want to get around some of the implicit semantics of the other language in an explicit fashion.

■ If you're looking for an increase in speed.

■ If you wish to escape the arbitrary limitations of the other language.

■ If you wish to set up your script as a free-standing program.

Like all mechanical translators, these translators fall short of producing an idiomatic translation. They'll give you a good place to start, however. Tweaking an existing Perl script is much more fun than writing one from scratch. We'll do some tweaking later in this article.

Translating sed Scripts

The **sed** program is a venerable stream editor based on the even more venerable **ed** editor. Its chief limitation as a programming language is that it has only two variables: pattern space and hold space. In this section we'll assume you know something about **sed**, or at least that you enjoy pretending you do.

Listing 1A shows the output of `ls -R`, that is, a recursive `ls`. Each directory name is listed, followed by all the non-directory files within that directory. This is fine reading material for humans, but many programs need the directory name and filename on the same line, as in Listing 1B. Hence, the **sed** script in Listing 1C.

Line 1 of that **sed** script deletes blank lines. Lines 2 through 6 locate lines containing directory names and store them in **sed**'s hold space after replacing the trailing colon with a slash. Lines 7 and 8 append the hold space to the pattern space and then swap the two fields to place the directory name first.

This is all well and good, but a **sed** script like that in Listing 1C cannot be a free-standing program–it must be fed as an argument to the **sed** program, typically running as part of a shell script. Translating the **sed** script to Perl allows it to stand on its own. The following commands illustrate the process:

```
$ sed -f pre.sed <in >o1
$ s2p -p pre.sed >pre.pl
$ chmod +x pre.pl
$ pre.pl in >o2
$ cmp o1 o2
```

The `-p` switch to **s2p** tells it that the corresponding **sed** script was never invoked with a switch. There is also a `-n` switch in **s2p** to tell it that the **sed** script was always invoked with `-n`. If neither switch is included, **s2p** inserts code that allows you to specify either switch when you run the script itself. If you look at Listing 1D, you'll see what `pre.pl` looks like.

Listing 1 continued

C. Here's a **sed** *script to do it:*

```
1  /^$/d
2  /:$/{
3      s/:$/\//
4      h
5      d
6  }
7  G
8  s/\(.*\)\n\(.*\)/\2\1/
```

D. Feeding the preceding **sed** *script to* **s2p** *produces the following Perl script:*

```
1  #!/usr/bin/perl
2  eval 'exec /usr/bin/perl -S $0 ${1+"$@"}'
3          if $running_under_some_shell;
4
5  $printit++;
6
7  $\ = "\n";                  # automatically add newline on print
8
9  LINE:
10 while (<>) {
11     chop;
12     if (/^$/) {
13         $printit = 0;
14         next LINE;
15     }
16     if (/:$/) {
17         s/:$/\//;
18         $hold = $_;
19         $printit = 0;
20         next LINE;
21     }
22     $_ .= "\n"; $_ .= $hold;
23     s/(.*)\n(.*)/$2$1/;
24 }
25 continue {
26     print if $printit++;
27 }
```

E. Tweaking the Perl script above yields the one below:

```
1  #!/usr/bin/perl
2
3  LINE:
4  while (<>) {
5      next LINE if /^$/;
6      if (s#:\n$#/#) {
7          $directory = $_;
8      }
9      else {
10         print $directory,$_;
11     }
12 }
```

F. Here's the same script in a more concise form:

```
1  #!/usr/bin/perl -p
2  next if /^$/;
3  $dir = $_, next if s#:\n$#/#;
4  print $dir, $_;
```

Line 1 lets the script be a free-standing program on machines that support the `#!` notation. The remainder of the line specifies which interpreter to use. On those less fortunate machines that don't support `#!`, lines 2 and 3 accomplish the same effect by making the shell execute the Perl interpreter. The second line simply passes the shells arguments to Perl, which runs in place of the shell. The shell never sees the third line because it does an **exec** on the second, and Perl never executes the second line because the third line is a statement modifier that is always false.

This `pre.pl` script is obviously not as concise as the **sed** script from which it is derived, but **s2p** is trying to be correct rather than concise. The **sed** editor has some odd semantics with regard to the implied newline at the end of the string–for instance, the **sed** command to append the hold space to the pattern space actually appends a newline first, followed by the hold space. This is shown in line 22 of the Perl script.

continued

Similarly, line 11 chops the newline off of every incoming line, while the assignment at line 7 causes the **print** statement at line 26 to add a newline back onto every outgoing line. The **while (<>)** loop at line 10 reads the lines from all the files mentioned on the command line, or from standard input if none are specified. All of this is there to explicitly emulate the implicit semantics of **sed**.

The actual **sed** script has been translated into lines 12 through 23. Compare line 23 with line 8 in the **sed** script, and note how Perl avoids backslashes. One of the design goals of Perl was to keep regular expressions from looking like a heap of match sticks. Line 23 is nice, but line 17 is still pretty disgusting.

We do something about this in Listing 1E, the first of our promised tweaks. It's a simple matter to change the delimiter to something other than slash, as we've done on line 6. Therefore we don't need to backslash the slash in the replacement pattern. We could have done this in the substitution of the **sed** script, but Perl also lets you do the same thing with ordinary patterns and with any quoted string, for example: in **s///**, you can replace the slashes with any non-alphanumeric delimiter. You can also do the same thing with **m//** for pattern matches, **q//** for single quotes around a string, **qq//** for double quotes around a string, and **qx//** for backticks around a string.

Getting back to Listing 1E, we've also removed all the claptrap having to do with the implied newlines. Perl is usually just as happy to keep the newlines on the end of the string–note that the **$** in the pattern on line 5 matches the end of the string even though there's a newline there. We also simplified the logic by printing the directory name first, an option not available in **sed**. We've also disposed of the **continue** block, so that skipping lines can be done with just a **next** statement.

Despite the apparent dissimilarity, the script in Listing 1F is almost identical to 1E. We've used Perl's **-p** option to supply an implicit **while (<>)** loop, and turned the logic of second conditional (line 6 in 1E) inside out in order to use a statement modifier on line 3. The modifier governs the entire expression on the left, including both sides of the comma operator. Script 1F is in no way superior to script 1E–it's included merely to show that **sed** doesn't have a corner on conciseness.

Don't Worry, Be Happy

We translated our first **sed** script simply because we wanted to run it as a program. Admittedly, that's not much motivation. With our next **sed** script, translation is a near necessity because the algorithm needs to take in an entire paragraph at a time. If the paragraph is longer than **sed**'s pattern space, you lose.

The **sed** script in Listing 2A prepares a file to be imported by a word processor. Most text files use newlines to terminate each line, and a double newline (blank line) to terminate each paragraph. Most word processors prefer to have newlines only at the end of each paragraph, or in ordinary text-editing terms, each paragraph is a single long line. Lines 1 through 7 of the script read input lines and append them to the pattern space (**N**) until the end-of-file is reached (**$**) or the last line we appended is null and results in an explicit newline at the end of the pattern space). The **b** line branches to the label at the top.

Lines 8 through 10 are applied to the paragraph as a whole. First, any new lines that look like they end a sentence are turned into two spaces. Then, all other newlines are turned into single spaces. We also translate tabs to single spaces–you can't see the tab on line 10, but it's there.

After running the script through the **s2p** translator, we get Listing 2B. Except for the four claptrap lines (11 through 14) that emulate the **N** command, the **sed** commands translate straight across. As you might have guessed, the **length** function returns the length of its argument string, or the length of **$_** if no argument is supplied. Note that **s2p** has optimized the branch operation into a **redo** statement, which restarts the loop without re-evaluating the conditional. The **chop** operator has been moved into the conditional of the **while** loop so that the string

LISTING 2: This set of scripts turns block paragraphs into fodder for your favorite word processor.

A. Here's the **sed** *version:*

```
1  :top
2  $!{
3      /\n$/!{
4          N
5          b top
6      }
7  }
8  s/\([.!?:][’"]*\)\n/\1  /g
9  s/\n/ /g
10 s/      / /g
```

B. Here's the output of **s2p**:

```
1  #!/usr/bin/perl
2  eval 'exec /usr/bin/perl -S $0 ${1+"$@"}'
3          if $running_under_some_shell;
4
5  $\ = "\n";              # automatically add newline on print
6
7  LINE:
8  while (chop($_ = <>)) {
9      unless (eof()) {
10         unless (/\n$/) {
11             $_ .= "\n";
12             $len1 = length;
13             $_ .= <>;
14             chop if $len1 < length;
15             redo LINE;
16         }
17     }
18     s/([.!?:][’"]*)\n/$1  /g;
19     s/\n/ /g;
20     s/\t/ /g;
21     print;
22 }
```

C. Here's the idiomatic version:

```
1  #!/usr/bin/perl
2
3  $/ = "";                    # paragraph mode
4
5  while (<>) {
6      s/([.!?:][’"]*)\n/$1  /g;
7      s/\n/ /g;
8      s/\t/ /g;
9      s/ +$/\n/;
10     print;
11 }
```

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doesn't get chopped twice when we **redo** the line. On line 20 **s2p** has made the tab character more visible using the traditional C language backslash sequence.

Listing 3C is the tweaked version. Instead of having explicit code to recognize the end of a paragraph, it relies on Perl's paragraph input mode. As in **awk**, this is done by setting the input record separator to the null string. We then do the same transformations on each paragraph, but we have to replace the final newline because we don't have an implicit newline and we have translated the explicit newlines to spaces.

awk with an Attitude

Many systems have a file that logs incoming and outgoing e-mail. On our system, mail delivery information is logged in a file called **syslog**. Scattered throughout this file are lines like those in Listing 3A. To produce a report such as that in Listing 3B, you could use the **awk** script in 3C.

The first script has two parts. In the first part, all input lines that begin with "from" in the seventh field are selected, and the name and number of bytes sent

LISTING 3: This example demonstrates the use of a2p to translate awk scripts to Perl.

A. *Here are some (slightly doctored) lines from my* **syslog** *file:*

```
Aug 18 11:12:24 netlabs sendmail[9578]: AA09578: message-id=<91051818
12.AA09578@netlabs.netlabs.com>
Aug 18 11:12:24 netlabs sendmail[9578]: AA09578: from=lwall, size=263
7, class=0
Aug 18 11:12:28 netlabs sendmail[9580]: AA09578: to=blurfl!fetridge!m
urgatroyd@uunet.UU.NET, delay=00:00:04, stat=Sent
```

B. *Here's the sort of report I'd like to see, only with about a hundred more lines of output...*

```
Name                                  Bytes  Msgs
basket!case@uunet.uu.net             182346    13
hokey@plus5.com                       38120     2
jon                                  112345    26
lwall                               1823149   129
suzieq@finagle.applied.math.spu.edu     481     1
```

C. *Here's an* **awk** *script to extract data from a* **syslog** *file:*

```
 1  $7 ~ /^from/ {
 2      name = substr($7, 6, length($7) - 6)
 3      count[name]++
 4      bytes[name] += substr($8, 6, length($8) - 6)
 5  }
 6
 7  END {
 8      printf "%-40s %8s %4s\n", "Name", "Bytes", "Msgs"
 9      for (name in count) {
10          printf "%-40s %8d %4d\n",
11            name, bytes[name], count[name] | "sort"
12      }
13  }
```

continued

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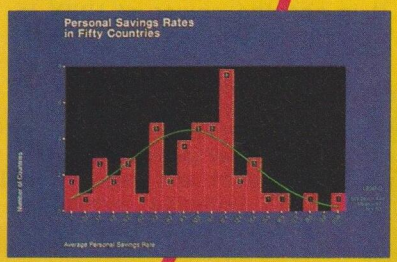

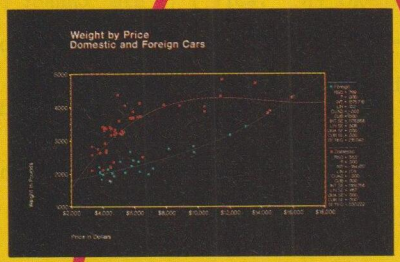

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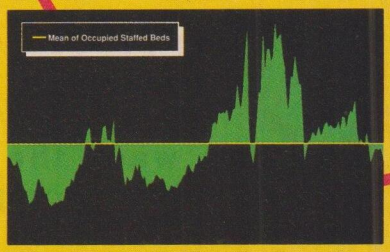

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are extracted from the line. The number of bytes and the message count are accumulated in a pair of associative arrays indexed by the name.

In the final part, which occurs after all input has been read, the associative arrays are printed out and the resulting output piped through the **sort** program to be sorted by name.

Note that **awk** automatically splits each input line into fields even when it is immediately going to throw the line away. It also requires some fancy footwork to extract the name and the number of bytes without the trailing comma. The version of **awk** that I have couldn't be persuaded to accumulate the number of bytes into the associative array unless I trimmed the trailing comma from the number. (Perl isn't quite so persnickety.)

In the interest of saving time, we could run this through the **a2p** translator. The resulting Perl script (see Listing 3D) actually runs a bit slower because we're still doing the same split on every record, but now that it's an explicit split we can do something about it. You've seen the first few lines in the output of **s2p**. The incantation at line 7 is there in case the script relies on the user passing values via **VARIABLE=value** switches on the command line. This particular script doesn't, but the translator can't easily determine that. You can delete the line if you care, but it doesn't hurt to leave it in.

Line 10 explicitly opens the pipe to the sort program that is implicitly

Listing 3 continued

***D.** Here's the translated Perl script:*

```
1  #!/usr/bin/perl
2  eval "exec /usr/bin/perl -S $0 $*"
3      if $running_under_some_shell;
4                  # this emulates #! processing on NIH machines.
5                  # (remove #! line above if indigestible)
6
7  eval '$'.$1.'$2;' while $ARGV[0] =~ /^(\w+=)(.*)/ && shift;
8                  # process any FOO=bar switches
9
10 open(SORT_FH, '|sort') || die 'Cannot pipe to "sort".';
11
12 $[ = 1;              # set array base to 1
13
14 while (<>) {
15     ($Fld1,$Fld2,$Fld3,$Fld4,$Fld5,$Fld6,$Fld7,$Fld8)
16             = split(' ', $_, 9999);
17     if ($Fld7 =~ /^from/) {
18         $name = substr($Fld7, 6, length($Fld7) - 6);
19         $count{$name}++;
20         $bytes{$name} += substr($Fld8, 6, length($Fld8) - 6);
21     }
22 }
23
```

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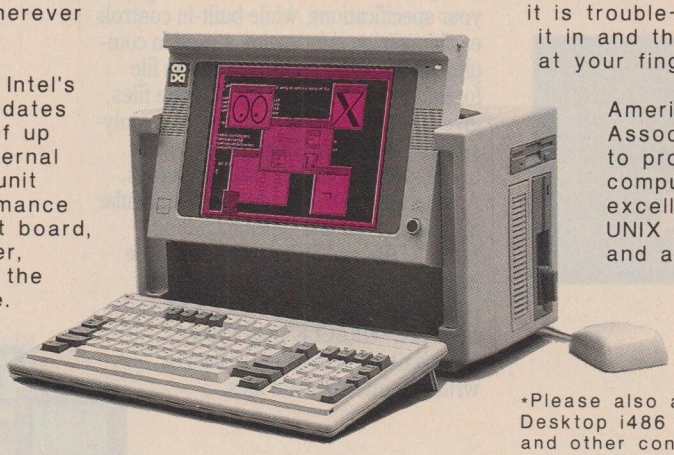

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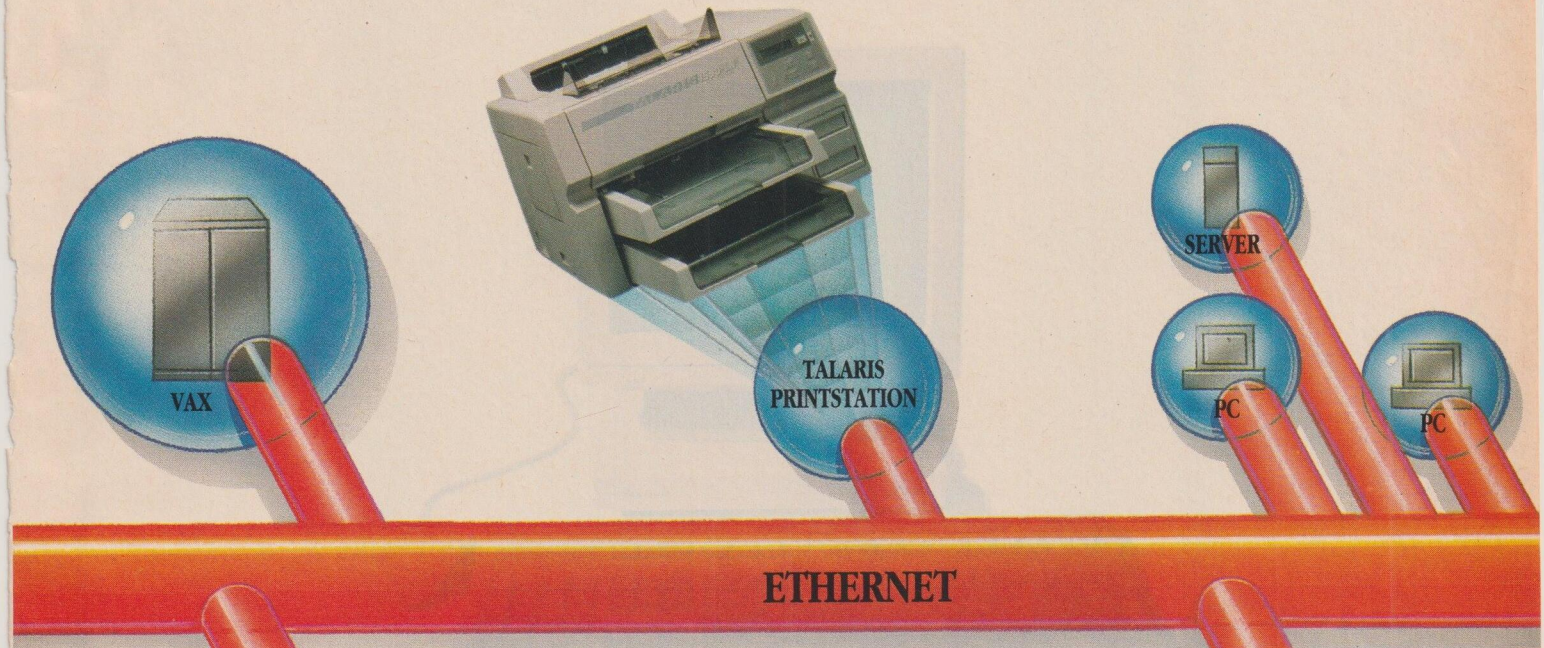

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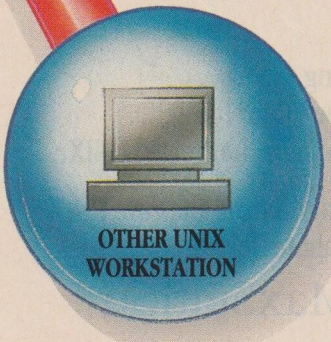

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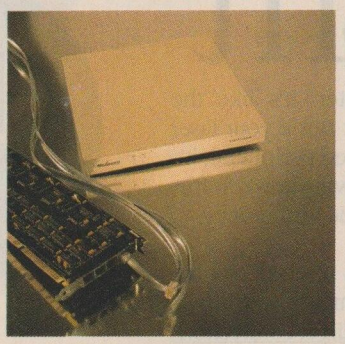

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Listing 3 continued

```
24  printf "%-40s %8s %4s\n", 'Name', 'Bytes', 'Msgs';
25  foreach $name (keys %count) {
26      printf SORT_FH "%-40s %8d %4d\n",
27        $name, $bytes{$name}, $count{$name};
28  }
```

***E.** Here's how the* **-n** *switch changes the main loop:*

```
1  while (<>) {
2      ($mon,$mday,$time,$host,$sm,$num,$from,$size)
3            = split(' ', $_, 9999);
4      if ($from =~ /^from/) {
5          $name = substr($from, 6, length($from) - 6);
6          $count{$name}++;
7          $bytes{$name} += substr($size, 6, length($size) - 6);
8      }
9  }
```

***F.** And here's the same thing using pattern matching:*

```
1  while (<>) {
2      next unless ($from, $size) = / (from=[^,]*,) (size=\d+)/;
3      $name = substr($from, 5, length($from) - 6);
4      $count{$name}++;
5      $bytes{$name} += substr($size, 6);
6  }
```

***G.** Here's a more idiomatic version:*

```
1  #!/usr/bin/perl
2
3  while (<>) {
4      next unless ($name, $size) = / from=([^,]*), size=(\d+)/;
5      $count{$name}++;
6      $bytes{$name} += $size;
7  }
8
9  printf "%-40s %8s %4s\n", 'Name', 'Bytes', 'Msgs';
10 foreach $name (sort keys(%count)) {
11     printf "%-40s %8d %4d\n",
12         $name, $bytes{$name}, $count{$name};
13 }
```

***H.** And here's "the Other Way":*

```
1  #!/usr/bin/perl
2
3  while (<>) {
4      next unless /: from=([^,]*), size=(\d+)/;
5      $count{$1}++;
6      $bytes{$1} += $2;
7  }
8
9  foreach $name (sort BY_SIZE keys(%count)) { write; }
10
11 sub BY_SIZE { $bytes{$b} <=> $bytes{$a}; }
12
13 format STDOUT_TOP =
14 Name                                    Bytes Msgs
15 .
16 format STDOUT =
17 @<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<< @######## @###
18 $name,                                  $bytes{$name},$count{$name}
19
```

opened by the **awk** program. This gives you better control over exactly when you open it and how you handle any errors encountered. The **printf** statement at line 26 will simply print to the filehandle **SORT_FH**–it doesn't need to know what the actual command was. Line 12 sets the subscript base to 1, as it is in Fortran and **awk**. Ordinarily, Perl programmers leave the subscript base set to 0, the default.

The Perl version also explicitly places a loop statement around the primary pattern matching code. There's no need for a strange **END** condition–the trailing code simply follows the main loop. If you want to add another main loop afterwards, you can do so in Perl.

Another nice thing about Perl is that it enables you to write readable code. Rather than the anonymous **$7**, translated to **$Fld7** in Listing 3D, you can tell

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LISTING 4: This example demonstrates how to translate `find` commands to Perl.

A. Here's a find command right out of my **crontab** *file:*

```
find / -name '.nfs*' -mtime +7 -exec rm -f '{}' \; \
       -o -fstype nfs -prune
```

B. Here's what **find2perl** *turns that into:*

```
 1  #!/usr/bin/perl
 2
 3  require "find.pl";
 4
 5  # Traverse desired filesystems
 6
 7  &find('/');
 8
 9  exit;
10
11  sub wanted {
12      /^\.nfs.*$/ &&
13      (($dev,$ino,$mode,$nlink,$uid,$gid) = lstat($_)) &&
14      int(-M _) > 7 &&
15      (unlink($_) || 1)
16      ||
17      ($nlink || (($dev,$ino,$mode,$nlink,$uid,$gid)=lstat($_))) &&
18      $dev < 0 &&
19      ($prune = 1);
20  }
```

C. Here's a more readable version of that subroutine:

```
1  sub wanted {
2      ($dev,$ino,$mode,$nlink,$uid,$gid) = lstat($_);
3      if (/^\.nfs/ && -M _ >= 8) {
4          unlink($_);
5      }
6      elsif ($dev < 0) {
7          $prune = 1;
8      }
9  }
```

a2p to use a list of names for the fields via the **-n** switch. To produce line 2 in Listing 3E, I invoked the conversion program as **a2p -nmon,mday,time, -host,sm, num,from,size**. It doesn't make much difference when we're only referring to two fields, but it's still reassuring to see all those fields named right off the bat.

As I mentioned earlier, we can do something about those unnecessary splits. One way is to use a regular expression that extracts just those fields we want from the records we want. In line 2 of Listing 3F we use a pattern in an array context to extract just two fields into two variables. If the pattern doesn't match, the pattern returns a null list and the list assignment returns a 0 value to the **unless**. Because 0 is false, the **next** statement skips the current line, which is exactly what we want it to do.

The **substr** function in Listing 3F has been rewritten using a subscript of five not six, assuming that the **$[** assignment has been deleted. But it's a bit silly to use a regular expression to extract the fields when we can just as easily tweak the regular expression to extract only the bits we are interested in. Then we can scrap **substr** entirely, as in Listing 3G.

This version contains another innovation that isn't easy to do in **awk**, because **awk** doesn't have the concept of lists–but Perl does. At line 10, the **foreach** operator is looking for a list value to iterate over. It doesn't care what kind of a list value you give it. Earlier, the **a2p** program earlier supplied the construct **keys (%count)**, which is a list consisting of all the keys of the associative array **count**, in no particular order. Here we insert the **sort** operator in front, and the list is sorted into alphabetic order before **foreach** iterates over it. There's no need for the overhead of an extra process.

As always in Perl, *there's more than one way to do it.* Listing 3H shows a faster, but slightly less readable, way to write the main loop. In this case, we evaluate the regular expression in a scalar (Boolean) rather than a list (array assignment) context, so the substrings matched by the parentheses are placed in the variables **$1** and **$2**, where we can get at them directly.

Instead of sorting by name, this version sorts on the size field in descending order by specifying a sort subroutine to do the comparisons. Sort subroutines are special subroutines that use variables

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CLOSING THE FEEDBACK LOOP

We present three contributions this month that relate to recently published columns. Keith Phillips submits a new version of the **mailcall** script from the May 1991 issue that reports the arrival of new mail rather than that the mailbox file has changed. Geoff Russell provides a relatively simple shell script terminal locking program inspired by the **lock** program in the March 1991 issue. Subodh Bapat provides some good suggestions for improving April 1991's **tprint2**. I've implemented his suggestions and present **tprint3**. Enjoy.

You Have New Mail

Dear Dr. Thomas:

First, kudos to you and *UNIXWORLD*. While graphical user interfaces are nice, those of us who "grew up" with the command-line interface appreciate the solutions presented in each issue.

[*Doctor's response.* Thanks for your sentiments. I believe that the tutorial-oriented articles and columns in *UNIXWORLD* should reflect the heritage of this operating system. I will continue to provide shell and C program solutions for my readers.]

The **mailcall** script written by Jorge Vaz published in your May 1991 column is excellent. It does have one shortcoming, however. Displaying a message when the user's mailbox changes isn't as helpful as displaying a message only when new mail has arrived. For instance, I quickly got tired of the message flashing again to indicate my mailbox was empty after I'd read my mail and exited the mail reader. My **mailcall2** script [see Listing 1] only notifies the user when new mail has arrived. As with the old version, it assumes that the modification time of the mailbox file has been updated, but only displays a message if the size of the mailbox file has increased.

Explanation of enhancements. I've added a new function, **Boxsize()**, which simply returns the size of the mailbox file. Both this function and the former **Boxdate()** function now use **awk** to extract the desired information from the **ls -go** command output. Furthermore, if the mailbox file doesn't exist or has zero length, these functions return 0.

The major change is testing to see if the current mailbox size, stored in **Newsize**, is larger than it was when the check was last made (stored in **Oldsize**). If so, the message "You have new mail"

LISTING 1: An enhanced version of `mailcall`, here named `mailcall2`, reports new mail if the mailbox file size has increased.

```
:
# @(#) mailcall2 Periodically check for new mail
# Author: Jorge Vaz, January 1990
# Revised by: Keith Phillips, May 1991
# Revised by: Chris Hare, June 1991
# set -x  # Uncomment for debugging
Chkfile=$HOME/.checkmail  # mail check sentinel file
Maildir=/var/mail  # Parent directory for mail file
Usage="Usage: $0 [ off | on [ interval (sec) ] ]"
#
case $1 in
  "on" ) # turn on checking
      if [ -f $Chkfile ]; then
        echo "$0: Mail arrival checking already enabled"
        exit 2
      fi
      Interval=${2:-"60"}   # set check frequency
      expr $Interval + 0 >/dev/null 2>&1
      if [ $? -ne 0 ]; then
        echo "$0: Time interval must be numeric" >&2
        exit 3
      fi
      # Use MAIL if not null, otherwise construct path:
      Mailfile=${MAIL:-$Maildir/"logname"}
      Boxdate() { # get mailbox modification time
        if [ ! -s $Mailfile ]; then # if no mail
          return 0        # nothing to do
        fi
        ls -go $Mailfile | # suppress owner, group names
          awk '{print $4, $5, $6}'
      }
      Boxsize() { # get mailbox size
        if [ ! -s $Mailfile ]; then # if no mail
          return 0        # nothing to do
        fi
        ls -go $Mailfile | # suppress owner, group names
          awk '{print $3}'
      }
      Oldmtime=`Boxdate` # Store old modification time
      Oldsize=`Boxsize`
      # Get terminal control codes:
      On=`tput smso`; Off=`tput rmso`; Flash=`tput flash`
      >$Chkfile  # Create empty mail check file
      # In background subshell:
      (trap "/bin/rm -f $Chkfile ; exit 127" 1 2 3 15
      echo "$0: Mail arrival checking enabled"
      while [ -f $Chkfile ]; do
        Newmtime=`Boxdate`
```

continued

is displayed. Otherwise, no message is sent. I recommend that you run **mailcall2** with a checking interval of at least a minute, which is the granularity of the time stamp provided by the **ls -go** command. Otherwise, you could miss the arrival of new mail.

Keith Phillips
Fort Valley, Ga.

Keep the Lock Simple

Dear Dr. Thomas:

There may be occasions when the **lock** program published in your March 1991 column is appropriate, but my shell script is much simpler. Like the previous C program, it doesn't work in a windowing environment. However, it should work in most other situations.

[*Doctor's notes:* Listing 2 depicts the **lock** shell script. This program is quite simple, yet effective. I've provided a line-by-line explanation].

Explanation of **lock** *operation.* The System V and BSD-derived **echo** commands recognize different arguments

Listing 1 continued

```
49          Newsize=`Boxsize`
50          if [ "$Oldmtime" != "$Newmtime" ]; then
51            if [ "$Newsize" -gt "$Oldsize" ]; then # new mail
52              echo "$Flash${On}You have new mail.$Off"
53            fi
54          fi
55          Oldmtime="$Newmtime"  # get current time
56          Oldsize="$Newsize"    # update size
57          sleep $Interval     # wait a while
58        done)&
59        exit 0 ;;
60    "") # just check status
61      if [ -f $Chkfile ]; then
62        ST=on
63      else
64        ST=off
65      fi
66      echo "$0 is $ST"
67      exit 0 ;;
68    "off") if [ ! -f $Chkfile ]; then
69          echo "$0: Mail arrival checking already disabled"
70          exit 2
71        else
72          /bin/rm -f $Chkfile
73          echo "$0: Mail arrival checking disabled"; exit 0
74        fi ;;
75    *) echo $Usage >&2; exit 1 ;;
76  esac
```


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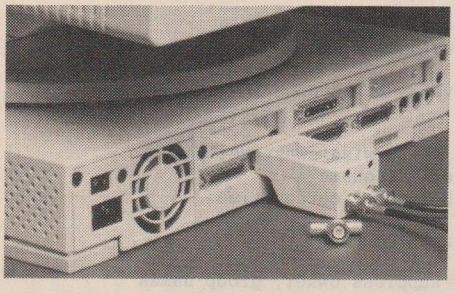

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LISTING 2: A simple shell script can be used to create a terminal screen locking program.

```
 1 :
 2 # #(@) lock Lock a character terminal
 3 # Author: Geoff Russell, April 1991
 4 # Revised: Chris Hare, June 1991
 5 # set -x    # uncomment for debugging
 6 SYSV="\c"   # uncomment this for System V echo; comment for BSD
 7 #BSD="-n"    # uncomment this for BSD echo; comment for System V
 8 STD_TRAP="2 3" # standard interrupt and quit signals
 9 #BSD_STOP="18"  # uncomment for BSD stop; comment for System V
10 #SVR4_STOP="24" # uncomment for SVR4 stop; comment for pre-SVR4
11 # Trap keyboard-generated signals:
12 trap "" $STD_TRAP $BSD_STOP $SVR4_STOP
13 stty -echo   # so no one can see what user types
14 echo $BSD "Enter password: $SYSV"      # prompt user
15 read p1     # collect the first password
16 echo; echo $BSD "Reenter password: $SYSV"  # prompt again
17 read p2     # collect second password
18 if [ "$p1" != "$p2" ]; then
19   echo ; echo "Passwords don't match. Try again." >&2
20   stty echo  # enable terminal echo before
21   exit 1   # aborting
22 fi
23 tput clear   # System V command to clear screen
24 # clear     # Use this clear screen command for BSD
25 while : ; do  # password collection loop
26   echo ; echo $BSD "Enter password: $SYSV"  # prompt
27   read p3 # collect response
28   case $p3 in
29     $p1)  # matches password so
30           break ;;  # exit collection loop
```

continued

for suppressing the newline. Uncomment line 6 and comment line 7 if you're using System V. Alternately, if you're using a BSD-derived **echo** command, comment line 6 and uncomment line 7. The subsequent **echo** commands in the script will now use the correct option/argument for suppressing the newline which is useful when prompting a user for input on the same line they type their response on.

The **trap** command (line 12) causes keyboard-generated signals (2, interrupt, 3, quit, and if available, 18, BSD stop, 24, SVR4 stop) to be ignored. With **trap** enabled, the user can't break out of the script by typing interrupt, quit, or stop signal characters. However, you should comment lines 9 and 10 for systems that don't recognize stop signals. Uncomment line 9 for BSD and SunOS or uncomment line 10 for System V Release 4 (SVR4) systems so that the appropriate keyboard-generated stop signal will be ignored.

Line 13 disables echo of typed characters so the password the user enters

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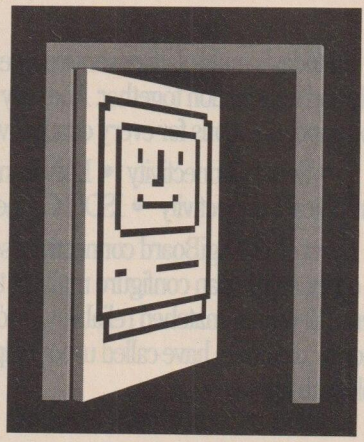

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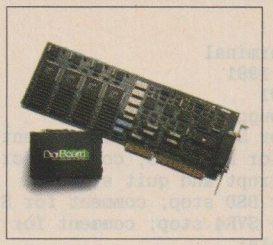

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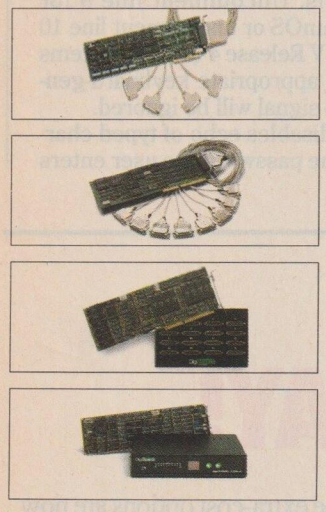

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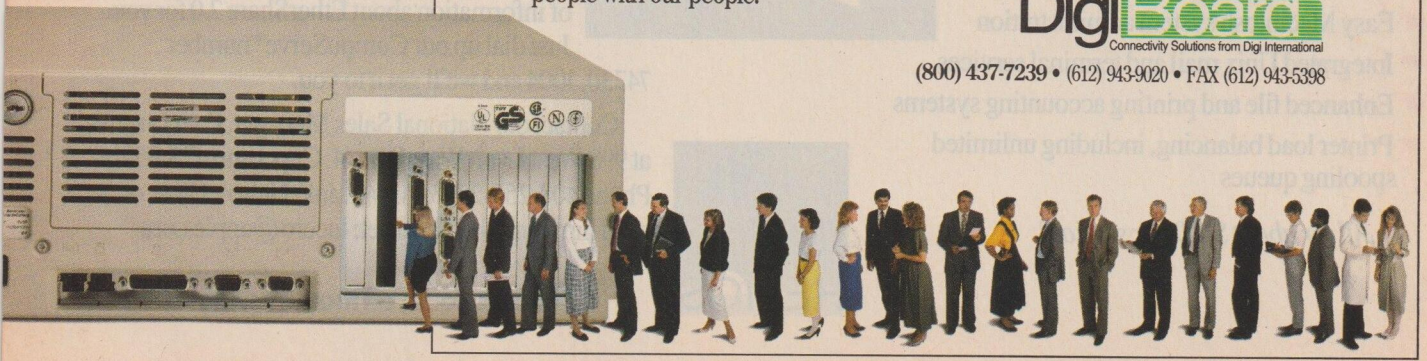

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CIRCLE NO. 36 ON INQUIRY CARD

GSA Schedule #GS00K90AGS5138

Listing 2 continued

```
31      *)      ;; # otherwise, stay in loop
32    esac
33  done
34  stty echo    # enable echo
35  echo         # place shell prompt on new line
```

LISTING 3: This enhanced version of the tprint2 program published April 1991 determines which macro package and preprocessors are necessary to format a troff-input document file. You can also specify an alternate formatting command and postprocessor command line.

A.** Listing of* **tprint3:*

```
 1 :
 2 # @(#) tprint3 Format and print document automatically
 3 # Author: Lee Brown, November 1990
 4 #     based on tprint by Becca Thomas and Ray Swartz
 5 # Enhanced by Becca Thomas, May 1991
 6 # set -x  # Uncomment for debugging
 7 Usage="Usage: $0 [-v] [cmdflags] [-c cmd] [-p postproc] file..."
 8 # Define default values of variables (customize for site):
 9 command=troff          # formatting command
10 macro=             # macro package
11 postproc="postsc | lp"     # ditroff to PostScript
12 picflags="-Tsc -D"       # pic invocation switches
13 tblflags=""           # tbl invocation switches
14 eqnflags=""           # eqn invocation switches
15 cmdflags="-Tsc -F/usr/lib/font" # formatting command switches
16 # Process command-line options:
17 while [ $# -gt 0 ]; do # while there are script options
18   case $1 in
19     -c) if [ -z "$2" ]; then  # specify formatter
20           echo "-c option requires an argument" >&2
21           echo $Usage >&2 ; exit 1
22         else
23           command="$2" ; shift ; shift
24         fi ;;
25     -m*)  macro="$1" ; shift ;;  # specify macro package
26     -p)   if [ -z "$2" ]; then  # specify postprocessor
27             echo "-p option requires an argument" >&2
28             echo $Usage >&2 ; exit 1
29           else
30             postproc="$2" ; shift ; shift
31           fi ;;
32     -v)   verbose=y ; shift ;;  # echo final command line
33     --)   shift ; break ;;    # end of options
34     -*)   cmdflags="$cmdflags $1" ; shift ;;
35     *)    break ;;        # end of options
36   esac
```

continued

cannot be seen. Lines 14-17 prompt and collect the user's password. The if statement (line 18) checks to see that they match. If not, line 19 reports the problem, terminal echo is restored (line 20), and the script terminates (line 21). This password verification is necessary because the user cannot see the typed password.

System V and BSD-derived systems use different commands for clearing the screen. This is done by uncommenting line 23 and commenting line 24 if you're using System V, and vice versa for BSD and SunOS. You want to clear your screen because you don't want anyone else to see what you had on your screen previously.

The while loop (lines 25-33) performs an endless of cycle of prompting the user for a password (line 26), collecting the response (line 27), and checking to see if it matches the previously entered password (case statement lines 28-32). If the new password matches the old (detected on line 29), the break command (line 30) causes control to pass to the first statement after the loop (line 34). If not, the loop continues (detected by line 31 and control passes to line 25). Line 34 rein-

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CIRCLE NO. 177 ON INQUIRY CARD

states terminal echo and line 35 outputs a newline to place the shell prompt on a new screen line.

Geoff Russell
Ethosoft
St. Morris, Australia

Yet Another Autoformatter

Dear Dr. Thomas:

The **tprint2** program published in your April 1991 column is certainly a great improvement over my **smartroff** program, which you published a year before that. Lee Brown's **tprint2** is smarter because it does not require the user to specify the macro package and preprocessors needed for formatting–it determines those from the formatting directives in the document itself. Lee Brown did an excellent job and I believe **tprint2** is likely to turn out to be one of the most helpful and frequently used tools from the "Wizard's Grabbag" column.

[*Doctor's comments.* Don't write off your **smartroff** program completely–it is more flexible than the **tprint** series of formatters because you can specify any command line to act on your document. You can also associate the appropriate formatting command line with the document file so that you don't have to recreate it each time you need to print the document.]

I do have a few minor suggestions for improvement:

■ The formatter should run **soelim** on the input files before it scans them for formatting directives. Some users will maintain tables, figures, and equation definitions in separate files. Separate **pic**-input files are often created by some graphical front-end tools. These files would then be referenced by source directives, **.so**, in the main document file. Most likely the start directives for the tables (**.TS**), figures (**.PS**), and equations (**.EQ**) would be in the referenced file. The current version of **tprint2** would fail to find these start directives, unless it was enhanced to run **soelim** on the document file. The **soelim** program replaces a source directive with the contents of the file it references. Then the start directives would be present in the document file scanned by **tprint2**.

■ The **tprint2** script should recognize the equation preprocessors: **eqn** for use with **troff** and **neqn** for **nroff**. These preprocessors allow a user to typeset mathematical expressions.

■ The formatter program should be

Listing 3 continued

```
37 done
38 # Construct formatting command pipeline
39 cmd=`soelim $* | nawk ' # read in any included files
40 BEGIN {
41    PicUsed = "n"; TblUsed = "n"; EqnUsed = "n"
42 }
43 # Look for telltale macro package directives:
44 $1 == ".LP" { if ( Macro == "" ) Macro = "-ms" }  # manuscript
45 $1 == ".VH" { if ( Macro == "" ) Macro = "-mv" }  # viewgraph
46 $1 == ".P" { if ( Macro == "" ) Macro = "-mm" }  # memorandum
47 $1 == ".TH" { if ( Macro == "" ) Macro = "-man" }  # manual
48 # Look for preprocessor start directives:
49 $1 == ".PS" { PicUsed = "y" }  # pic
50 $1 == ".TS" { TblUsed = "y" }  # tbl
51 $1 == ".EQ" { EqnUsed = "y" }  # eqn
52 # Stop searching if we have enough information
53 {
54   if ( Macro != "" && PicUsed == "y" && \
55   TblUsed == "y" && EqnUsed == "y" )
56     exit  # stop processing input files
57 }
58 # Construct command and write it to stdout
59 END {
60   printf "soelim %s | ", Files
61   if ( PicUsed == "y" )
62     printf "pic $picflags | "
63   if ( TblUsed == "y" )
64     printf "tbl $tblflags | "
65   if ( EqnUsed == "y" )
```

continued

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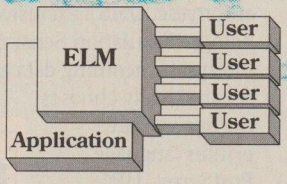

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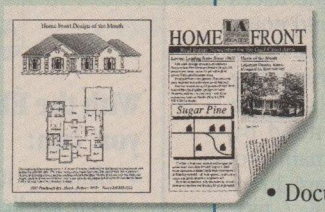

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customizable. For instance, you could specify alternate formatters, such as **nroff**, **imagenroff**, **qmsroff**, or whatever ***roff** software drives the output device.

■ The postprocessor programs should be customizable. Specify one program or a pipeline of programs for postprocessing the formatter output. For instance, when using **nroff**, pipe the output to **col** to filter reverse line motions for display on a terminal. Then pipe the output of **col** to a pager, such as **pg**, to provide a character-based preview of document formatting.

I have not written up **tprint3** with these enhancements, as they are all minor and could be added in by any shell hacker. I merely mention them as they might be helpful to some people.

[*Doctor's notes:* Part A of Listing 3 shows the **tprint3** program that I have created to include all the features in this "wish list." Parts B through D show sample script invocations and the resulting formatting command lines produced by **tprint3**.]

Subodh Bapat
Racal Milgo
Ft Lauderdale, Fla.

Listing 3 continued

```
66      if ( Command == "nroff" )
67         printf "neqn $eqnflags | "
68      else
69         printf "eqn $eqnflags | "
70    printf "%s $cmdflags %s", Command, Macro
71 }' Command="$command" Macro="$macro" Files="$*"`
72 # Perhaps display but execute command pipeline:
73 if [ "$verbose" = "y" ]; then
74   eval echo \"$cmd \| $postproc\"
75 fi
76 eval $cmd \| $postproc
```

***B.** Preview formatting a document that has* **pic**, **tbl**, *and* **eqn** *directives:*

```
$ tprint3 -v -a -p pg doc1
soelim doc1 | pic -Tsc | tbl | eqn | troff -Tsc -F/usr/lib/font -a -ms | pg
$ ▮
```

***C.** On-screen document previewing using* **nroff**:

```
$ tprint3 -v -c nroff -p "col | pg" doc2
soelim doc2 | tbl | nroff -Tsc -F/usr/lib/font -ms | col | pg
$ ▮
```

***D.** Formatting a document with* **troff** *for a PostScript laser printer:*

```
$ tprint3 -v -a -p lp doc2
soelim doc2 | troff -Tsc -F/usr/lib/font -ms | lp
$ ▮
```

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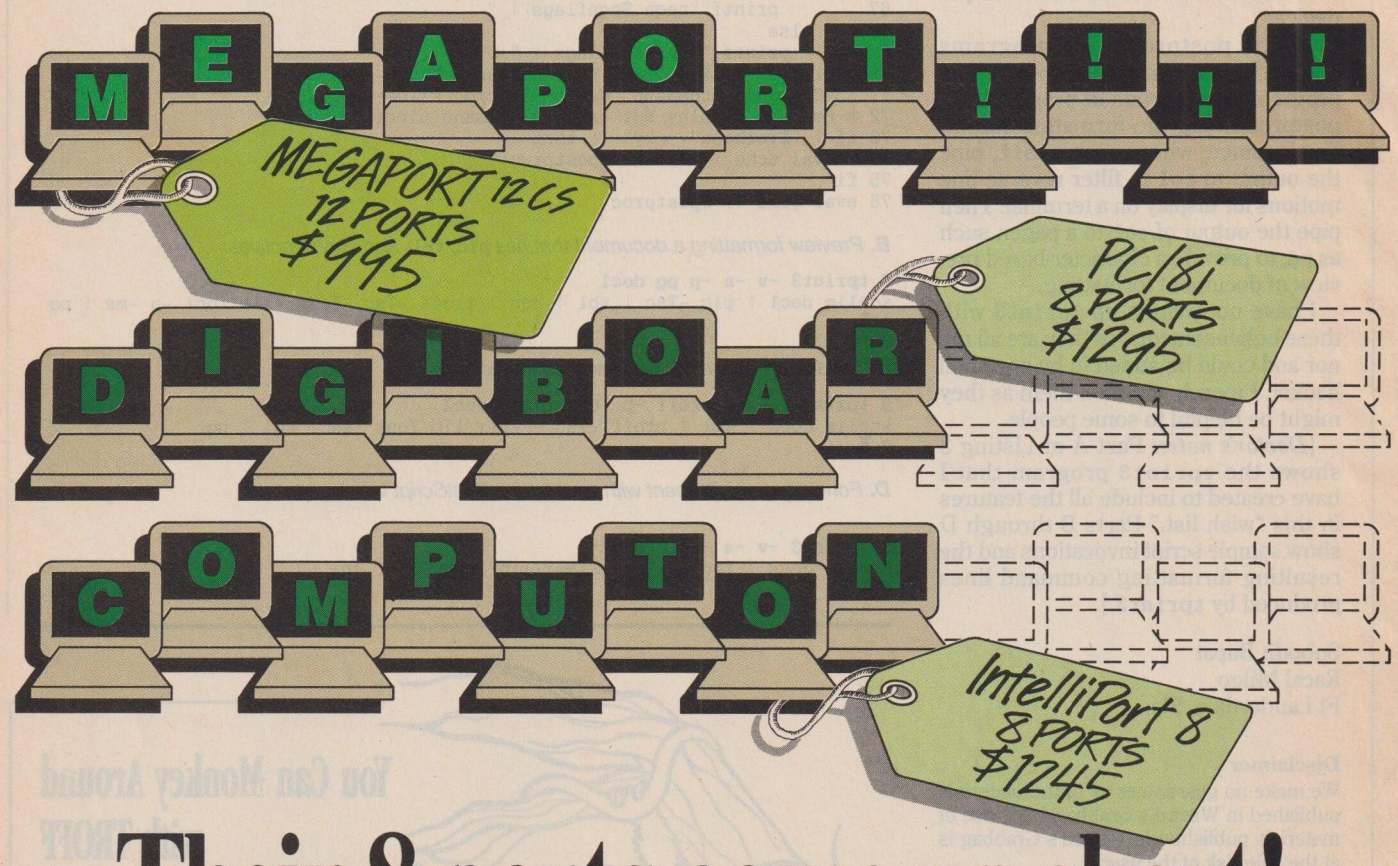

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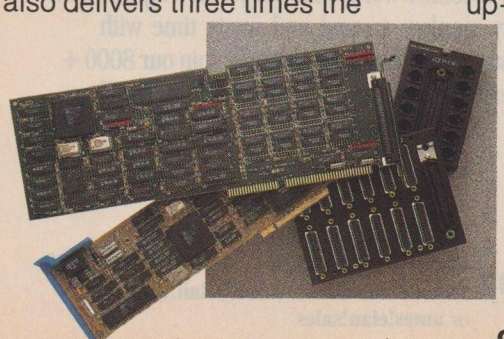

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CIRCLE NO. 210 ON INQUIRY CARD

Ray Swartz

SETTING OFF FIREWORKS WITH curses

Henry Hurwitz wants to do things on UNIX that he can do in DOS, such as run a visually interesting screen-saver program. I show him how to write a screen saver program using the **curses** C library, that I've named **fireworks**. Dennis Hartson asks me to recommend a good TCP/IP book.

Creating Fireworks on UNIX

Question: As an MS-DOS user who occasionally works in UNIX, I need a script to take over the screen with some pretty moving pattern when I take a coffee break.

Henry Hurwitz
Schenectady, N.Y.

Mr. Hurwitz' question is similar to a question in my July 1990 column, in which the reader asks how to blank the system's console when it is inactive. The solution is a script that sends the clear screen escape sequences to the console after a default amount of time has passed without any keyboard input. The idea behind this is to prevent burning out pixels in the display screen's phosphor.

The screen-blanking script is scheduled to run every 20 minutes using **cron**. The key is to determine when output was last sent to the terminal. The system maintains this information in the modification time of the terminal's device file. Using the current time and the terminal's modification time, which can easily be obtained with **ls -l**, you can calculate how long it has been since anyone used a specific terminal. Thus, let me refer you to the July 1990 column for the answer to blanking the screen when you go on a coffee break.

Alternately, you can create a screen full of "pretty" moving patterns instead of the blank screen. We can write a program that is similar to **pyro**, which blanks a Macintosh's screen and then runs an animation of a fireworks display.

At first, I thought there was no way to simulate a graphic application like **pyro** on character-based terminals. However, using good old UNIX tools, I've created a program for a character window that approximates **pyro**. What's more, my version–called **fireworks**–should work with any terminal running on any UNIX system.

The key to it is **curses**, the UNIX system screen handling and optimization package (included in BSD, Sun OS, Systems III and V, and XENIX systems) that describes a set of standard C library

LISTING 1: While it may not be as good as the Macintosh version, fireworks is an entertaining diversion to run while you take a break.

A. *The source code for* **fireworks** *relies on the* **curses** *library to control the terminal:*

```
#include <stdio.h>
#include <signal.h>
#include <curses.h>
#include <ctype.h>
#include <sys/types.h>
#include <time.h>

#define DELAYSIZE 100000  /* delay counter */

char SCCSID[] = "@(#) fireworks.c written by Ray Swartz";

main()
{
    int start;        /* starting column (bottom row) */
    int end;          /* ending column */
    int row;          /* for loop height counter */
    int diff;         /* lines to ascend = abs(start-end) */
    int flag;         /* 1/0 value to control ascending refresh */
    int direction;    /* -1 = right to left, 1 = left to right */
    int curquit();    /* terminates curses properly on interrupt */
    int myrefresh(); /* refresh() with a delay counter */
    int seed;         /* random number seed */
    void explode();   /* draw the explosion */

    signal(SIGINT, curquit);      /* terminate with interrupt */
    initscr();      /* initialize curses (required) */
    seed = time( (time_t *)0);    /* use time in seconds as seed */
    srand(seed);          /* seed random generator */
    while (1) {           /* keep drawing until interrupted */
        do {              /* calculate rocket coordinates */
            start = rand() % (COLS - 3);  /* bottom column */
            end = rand() % (COLS - 3);    /* top column */
            start = (start < 2) ? 2 : start;  /* watch edges */
            end = (end < 2) ? 2 : end;        /* watch edges */
       /* direction = -1 is right to left, 1 is left to right */
            direction = (start > end) ? -1 : 1;
            diff = abs(start - end);  /* height = width */
        } while (diff<2 || diff>=LINES-2);  /* fit to screen */
        for (row=0; row<diff; row++) {  /* draw rocket going up */
            mvprintw(LINES - row, start + (row * direction),
                    (direction < 0) ? "\\" : "/");
            if (flag++) {  /* refresh every other time */
                myrefresh();  /* delay then refresh */
                clear();      /* animate rocket  */
                flag = 0;     /* draw only when flag > 0 */
            }
        }
```

continued

Listing 1 continued

```
48          if (flag++) {  /* refresh if flag == 1 at end of loop */
49              myrefresh();
50              flag = 0;
51          }
52          explode(LINES-row,start+(diff*direction));  /* showtime */
53          clear();      /* prepare for next rocket */
54          myrefresh();
55      }
56  }
57
58
59  int curquit()  /* be sure to quit curses properly */
60  {
61      endwin();   /* required to return terminal to proper mode */
62      exit(0);
63  }
64
65  void explode(row, col)   /* draw explosion */
66  int row;    /* row, col is center of the explosion */
67  int col;
68  {
69      clear();
70      mvprintw(row, col, "-");   /* step 1 */
71      myrefresh();
72      mvprintw(row - 1, col - 1, " - ");
73      mvprintw(row,     col - 1, "-+-");  /* step 2 */
74      mvprintw(row + 1, col - 1, " - ");
75      myrefresh();
```

continued

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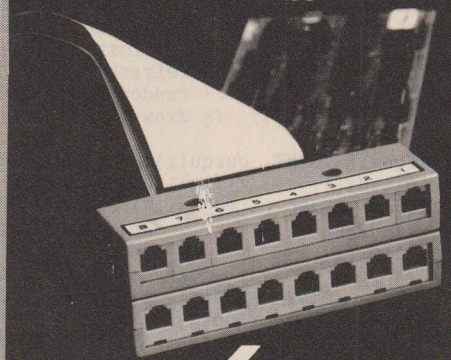

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CIRCLE NO. 234 ON INQUIRY CARD

functions. Combined with the terminal database **curses** provides this program's portability.

The major shortcoming of **fireworks** is that it uses only ASCII characters. It can't hold a (roman?) candle to an X version of the same program. However, in its defense, **fireworks** could be customized a bit more. Two modifications I can think of are using extended character sets and adding color for systems with color terminals.

Given the power of today's workstations, a window version of this program could be quite impressive. Someday I'd like to be able to write one version of **fireworks** and have it run in full-motion graphics on all major computing platforms. Excuse me if I don't hold my breath on this one, however.

The code for **fireworks** is shown in Listing 1A. The program works in three steps. First, **fireworks** picks a starting and ending column (lines 31 to 38), rejecting those that would start or explode off the screen. Second, it draws the rocket flying from the starting to the ending position (lines 38 to 51). Third, it flashes the explosion around the end point (lines 65 to 100).

The code has some constructs worth discussing. To make **curses** work properly, you must start with a call to **initscr()** and end with a call to **endwin()**. If this convention isn't followed, your program won't be set up properly or your terminal's port won't be reset correctly when the program exits. Further, once you have initialized **curses**, you can only use **curses** functions for input and output. Lastly, changes to the terminal don't show up until you call **refresh()**.

Because **fireworks** is designed to run until the user is ready to resume working, it terminates only when an interrupt is entered from the keyboard. The **curquit()** function (lines 59 to 63) insures that **endwin()** is called before the program terminates. The random number generator from the standard library function **rand()** is seeded with the current time, represented in the number of seconds since 1/1/70, truncated to an integer (line 27).

I originally refreshed the screen after each step in the rocket's elevation. However, this didn't look as nice as I wanted, so I introduced **flag** to refresh every other time (lines 42 to 46 and 48 to 51). Another problem with **refresh()** was that it occurred too fast on my Sun-3/60 when I was running it in a SunView window and I missed a good deal of the action. To slow it down, I used the BSD UNIX **usleep()** function which "sleeps"

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for a specified number of microseconds. On my Sun, a delay of a tenth of a second, or 100,000 microseconds, (represented by the **DELAYSIZE** macro) greatly improved the image of the pyrotechnics. To implement this, I wrote a wrapper for **refresh()** called **myrefresh()** (lines 104 to 110). You will probably have to experiment with different values for **DELAYSIZE** to tune the program to your system and display device.

Unfortunately, System V doesn't provide **usleep()** or a functional equivalent. System V has **sleep()**, but it only works in full seconds and a delay of a full second makes **fireworks** too slow.

The only other solution I can see is using a delay counter instead of **usleep()**. While this works, it has an undesirable effect: it wastes CPU time. The difference between **usleep()** and a counter is how the delay is accomplished: **usleep()** sets a timer and then sleeps until the timer expires, allowing other processes to access the CPU in the interim; a delay counter wastes time performing a very simple calculation instead of relinquishing the CPU to other processes.

On a single-user system, delay counters aren't a problem because the CPU time you are wasting is your own. On a multiuser system, the time the counter consumes could be used more productively by one of the processes that must wait while the counter is executing. While it's best not to use counters in UNIX programs, Listing 1B shows a delay counter version of **myrefresh()**.

Clearly, **fireworks** requires access to **curses** functions. To link this library into **fireworks**, add **-lcurses** to your command line when compiling, as shown in Listing 1B. You will also have to include the **terminfo** library with **-ltermlib**, or the **termcap** library by using **-ltermcap**. One last note, if you don't have a full development version of UNIX, you may not have the **curses** library. You can check your **/usr/lib** directory for the **curses** library, **libcurses.a**.

Listing 1 continued

```
 76        mvprintw(row - 2, col - 2, " --- ");
 77        mvprintw(row - 1, col - 2, "-+++-");
 78        mvprintw(row,     col - 2, "-+#+-");  /* step 3 */
 79        mvprintw(row + 1, col - 2, "-+++-");
 80        mvprintw(row + 2, col - 2, " --- ");
 81        myrefresh();
 82        mvprintw(row - 2, col - 2, " +++ ");
 83        mvprintw(row - 1, col - 2, "++#++");
 84        mvprintw(row,     col - 2, "+# #+");  /* step 4 */
 85        mvprintw(row + 1, col - 2, "++#++");
 86        mvprintw(row + 2, col - 2, " +++ ");
 87        myrefresh();
 88        mvprintw(row - 2, col - 2, "  #  ");
 89        mvprintw(row - 1, col - 2, "## ##");
 90        mvprintw(row,     col - 2, "#   #");  /* step 5 */
 91        mvprintw(row + 1, col - 2, "## ##");
 92        mvprintw(row + 2, col - 2, "  #  ");
 93        myrefresh();
 94        mvprintw(row - 2, col - 2, " # # ");
 95        mvprintw(row - 1, col - 2, "#   #");
 96        mvprintw(row,     col - 2, "     ");  /* step 6 */
 97        mvprintw(row + 1, col - 2, "#   #");
 98        mvprintw(row + 2, col - 2, " # # ");
 99        myrefresh();
100        return;
101    }
102
103
104    int myrefresh()
105    {
106        usleep(DELAYSIZE); /* timer to slow screen refresh down */
107        move(LINES - 1, COLS - 1);   /* keep cursor out of the way */
108        refresh();
109        /* Uncomment next line if pressing RETURN locks up terminal */
110        /* flushinp();   /* throw away pending input */
111    }
```

B. *A counter version of* **myrefresh()**:

```
int myrefresh()
{
    int count = DELAYSIZE;

    while (count--)    /* timer to slow screen refresh down */
        ;
    move(LINES - 1, COLS - 1);   /* keep cursor out of the way */
    refresh();
    /* Uncomment next line if pressing RETURN locks up terminal */
    /* flushinp();   /* throw away pending input */
}
```

C. *Be sure to include the* **curses** *and* **terminfo** *link libraries:*

```
$ cc fireworks.c -o fireworks -lcurses -ltermlib
```

How to Get Working on Networking

Question: I've just been assigned a project that requires me to understand TCP/IP inside and out. Can you recommend anything?

Dennis Hartson
Las Vegas, Nev.

Answer: In fact, I can. Doug Comer's book, *Internetworking with TCP/IP, Volume 1, Principles, Protocols, and Architecture* (published by Prentice-Hall, 1991), is a well-written, clear exposition on every aspect of TCP/IP. His discussion includes details of how the various protocols work, the contents of various packets, with a good measure of philosophy on why TCP/IP works the way it does. I highly recommend it.

Guidelines: Obviously, this column won't be of much interest unless you send us your questions. Try to make your questions as general interest as possible and please, no questions regarding specific hardware or third-party application packages. State the UNIX system version, if applicable, for the question at hand. Send your questions to Ray Swartz, "Answers to UNIX," c/o *UNIXWORLD*, 444 Castro St., Mountain View, CA 94041. Fax them to 415-967-1257. Send them via e-mail to: **uunet!uworld!ans2unix** or **ans@uworld.com**

Please remember to include your surface mailing address and telephone number. ■

Ray Swartz is the founder of Berkeley Decision/Systems, which specializes in C and UNIX training. His first book discusses using C for business applications, and he second book teaches shell programming using business-related examples.

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LOGOS LOGS IN WITH EUROPEAN LANGUAGES

The number of software firms targeting the admittedly complex, yet hopefully lucrative, translation software market has increased by one. Joining Tradux (E. Northport, N.Y.), IMT Multilingual System (New York, N.Y.), and International Multi Systems (Folsom, Calif.), is Logos Corp. Its Logos Intelligent Translation System designed for translators and document publishers, and is compatible with several word processing packages including WordPerfect; and document publishing systems including Interleaf and FrameMaker.

The Logos software works in two ways. Users can set it up to translate text automatically or on a deferred processing basis. As the translation is completed, source text appears in the upper half of a split screen, while the translated text appears in the lower half. Editing can be done in either half of the screen.

The software also allows translators to customize the dictionaries and semantic rules that produce translations in order to tailor translations to specific industries, companies, or applications. The custom capabilities extend to the concept of differentiating between meanings of words. Each word is classified according to broad categories such as noun or verb; and if a noun, it is further classified as to whether it represents a material object, abstract concept, person, organization, and so on. According to the company, users can create context-specific vocabulary and semantics rules, so that the software can differentiate between the ideas of "floating a boat" and "floating a stock issue."

The Logos software is initially available with English and German as the source, or input, languages, and English, German, French, Spanish, and Italian as the target, or output, languages. The initial platform is the Sun SPARCstation 2, with ports to IBM, HP/Apollo, and DEC workstations in the works. Prices range from $75,000 to $150,000, depending on which source-target language pair is purchased. **Logos Corp., 333 Elm St., Dedham, MA 02026; 617-326-7600.**

Circle No. 301 On Inquiry Card

What You See Is WysiWord

As companies are moving from proprietary platforms to open systems, so too are third-party developers. Microsystems Engineering Corporation (MEC) has traditionally been a developer for the Digital Equipment Corp. platform–its Mass-11 office automation software competes with DEC's All-In-One. MEC is moving into the multivendor market with WysiWord, integrated software combining word processing and basic presentation graphics capabilities to meet the needs of office workers. Together, the modules can be used to create manuals or other documents that would traditionally be done with desktop publishing programs.

According to MEC, Wysiword has been written with an identical file structure for each platform, so that users on different desktop machines using different operating systems can access the same files. WysiWord is initially available under Motif for Sun Microsystems and DEC machines, as well as for Macintosh, VAXstations using DECWindows, and PCs running Microsoft Windows 3.0. Scheduled for later this year are versions for Hewlett-Packard/Apollo, Silicon Graphics, and IBM workstations.

The software has three modules: word processing, drawing, and plotting. The drawing tool lets users create drawings or import graphics from other files. Users can also annotate, add shading, fill patterns, and insert arrows, among other features. A library of symbols lets users create flow diagrams, organizational charts, and newsletters.

The plotting module lets users plot data that has been input manually or imported from spreadsheets and databases. Graph types included are bar, pie, stacked bar, hi-lo-close, line, and XY plots. Cost for the UNIX version is $1,395, including the three modules and the utilities to convert text and graphics. The Macintosh version is $550, but only includes word processing, plotting, and text conversion utilities (the drawing module is not included). The PC version is $895 and includes the same software as the UNIX version. Site licensing is also available. **Microsystems Engineering Corp., 2400 W. Hassell Rd., Ste. 400, Hoffman Estates, IL 60195; 708-882-0111.**

Circle No. 302 On Inquiry Card

continued

```
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                   SEMANTHA Functions                    SEM502

Please make selection and press ENTER or else press PF3 to 'REVERSE'.

(1) Verb Noun = Verb (Prep) Noun
    e.g. Take(VT) N(Acc-Month,Day,Week) = Tardar N
(2) Verb Prep Noun = Verb (Prep) Noun
    e.g. Ask(VI) for N = Pedir N
(3) Verb Noun1 Prep2 Noun2 = Verb (Prep1) Noun1 (Prep2) Noun2
    e.g. Take(VT) N(ACC-Concr,etc) from N(Concr,etc) = Sacar N de N
(4) Verb-Particle Noun = Verb (Prep) Noun
    e.g. Make Up(VT) N(ACC-Face) = Maquillarse N(Cara)
(5) Verb-Particle Prep Noun = Verb (Prep) Noun
    e.g. Make Up(VT) for N = Recuperar N
(6) Verb-Particle Noun1 Prep2 Noun2=Verb (Prep1) Noun1 (Prep2) Noun2
    e.g. Take Up(VI) N(NOM-ACC) with N(Human,Hum.Org,etc) = Discutir
         N con N
(7) Noun1 Prep Noun2 = Noun1 Prep Noun2
    e.g. Payment(N) On N(Account) = Pago a N(Cuenta)
(8) Descriptive Adjective Noun = Adjective Noun
    e.g. National N(Debt) = N(Deuda) Pu1blica


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The Logos Intelligent Translation System's eight Semantha templates represent the types of rules that can be added for language translation.

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COMMUNICATIONS

Talking to the Mainframes

Serengeti Systems' 3780Link lets UNIX and XENIX users access IBM mainframes via bisynchronous terminal emulation. Used in electronic data interchange and point-of-sale systems, the software can be used for tax filing, automatic funds transfer, file transfer, and mainframe communications. The software includes mouse support, phone number directory, integrated line monitoring, built-in text editor, and detailed log files. Both AT and MicroChannel versions are available. Price is $1,195 and includes SyncCard, a synchronous communications adapter.

A version of 3780Link for developers called BSCLIB lets them integrate bisynchronous communications into their applications. The BSCLIB toolkit consists of a library of functions that can be liked with several languages, including C, Basic, Pascal, and Cobol. The toolkit also contains an applications programming interface (API) to control communication sessions. The BSCLIB price is $2,195 and includes one run-time license. Additional runtime licenses are $895 and quantity discounts are available. **Serengeti Systems, 808 W. 10th St., Ste. 101, Austin, TX 78701; 512-345-2211.**

Circle No. 303 On Inquiry Card

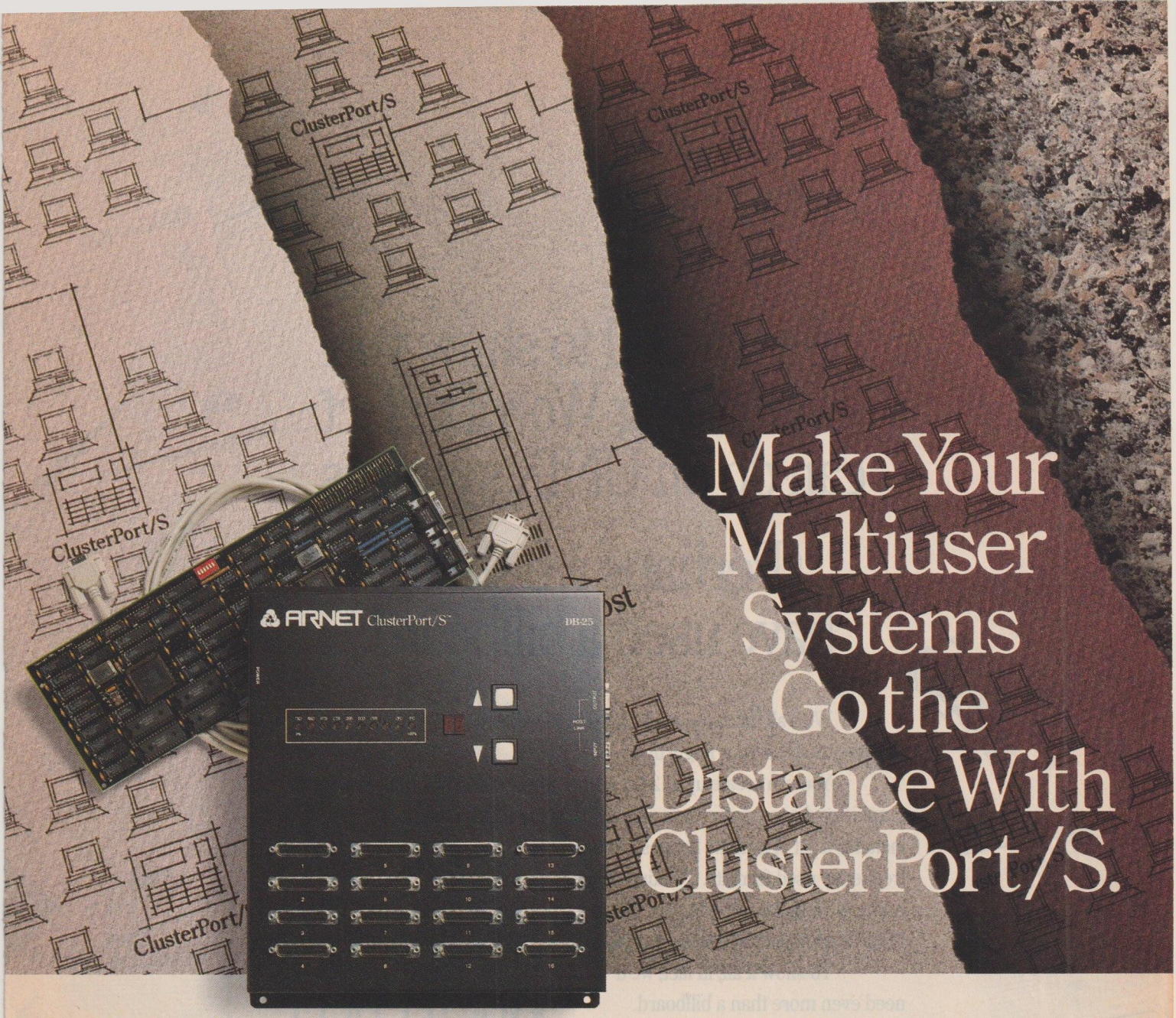
Mail Call

We're being deluged with electronic mail software: Alfafa's Poste and Applix's Asterix Mail have just been postmarked, along with Z-Code Software's Z-Mail. While Poste and Asterix Mail are both X Windows-based, Z-Mail will run on workstations running Motif or Open Look, character terminals, X terminals, PCs, or Macintoshes. With Z-mail comes Z-Script, which allows users to customize the mail program with sorting, prioritizing, adding functions and menus, and creating applications that automatically direct requests to appropriate parties.

Z-Mail also lets you attach and send other types of documents from other applications in use, including text, code, binaries, fax, voice, video, and application files. It also works with mail-transport agents with the X.400 and simple mail transfer protocols. List price is $295 for a single-user license, $1,395 for five users, and $2,495 for ten users. Distributed by **Siren Software, 750 Menlo Ave., Ste. 200, Menlo Park, CA 94025; 415-322-0600 or info@siren.com.**

Circle No. 304 On Inquiry Card

continued



Make Your Multiuser Systems Go the Distance With ClusterPort/S.

Whether you're connecting workgroups in the same building, different buildings or different cities, Arnet's new ClusterPort/S™ can go the distance.

ClusterPort/S gives ISA, EISA and Micro Channel® computers the capability to support workgroups up to 4,000 feet from the host! Even further via modem support to remote locations.

Each ClusterPort/S consists of a host adapter card and up to eight 16-port serial concentrators connected by a high-speed synchronous RS-422 link. As many as four adapter cards can be installed in a single host, providing support for a total of 512 users.

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CIRCLE NO. 189 ON INQUIRY CARD

We wanted to show you everything WordPerfect® can do on UNIX systems.

(Perhaps we should have used a billboard.)

With all the features available in WordPerfect® 5.0, great looking documents are at your fingertips.

You can create up to 24 columns, import graphics from leading graphic packages, and create graphic lines and text boxes. WordPerfect 5.0 includes a set of graphic images. And different styles can be created for frequently used formats. Printing supports as many as 250 fonts and 450 printers. You also get Macros, 110,000 -word Speller, Thesaurus, Merge, Print Preview, and of course, our legendary customer support.

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NETWORKING

Network Peripherals Back in the Ring

Following its fiber-distributed data interface (FDDI) adapters for AT- and Extended Industry Standard Architecture (EISA) bus-based computers, Network Peripherals now offers two separate adapters for SBus- and VMEbus-based workstations. The SBus adapter can only be attached to the FDDI network through one of Network Peripherals' FDDI concentrators, while the VMEbus adapter can be attached through the concentrator or directly to the FDDI network. Software drivers support SunOS, PC-NFS, and RISC/OS are available. Prices are $2,495 for the SBus adapter and $3,295 for the VMEbus adapter, in quantities of five or more.

Entry-level concentrators come with four FDDI ports and can be expanded two ports at a time, up to 16. Prices for the FDDI concentrators are $7,995 for an entry-level standalone hub; $10,995 for a "single-attach" version; and $11,995 for a "dual-attach" version to link a workgroup to a dual-ring FDDI network. **Network Peripherals, 2880 Zanker Rd., Ste. 206, San Jose, CA 95134; 408-954-7300.**

Circle No. 305 On Inquiry Card

A Chipcom off the Old Block

Chipcom has developed a UNIX-based network management system based on The Santa Cruz Operation's Open Desktop, incorporating the Motif graphical user interface (GUI) and an Ingres relational database management system (RDBMS) to keep track of Chipcom routers and bridges. Based on simple network management protocol (SNMP), the Online Network Control System (NCS) lets system administrators change network topologies (i.e., star or ring) and reconfigure devices on the network from their desktop. Linked to an Online System Concentrator, the system administrator can track an Ethernet, token ring, and FDDI network in a single concentrator. While Chipcom offers a 17-slot version of its concentrator for $4,950, it has also just introduced a six-slot version for $2,295.

With Online NCS, the system administrator can set and monitor alarm conditions and use the Ingres RDBMS to keep track of performance figures and network statistics. The software provides three types of alarms: major, minor, and alert. The type of alarm, its location, and the date and time are displayed in a pop-up window and entered into a log file. A "go to" button in the window lets administrators go directly to the location of the faulty device on a system map. The software also lets administrators write subroutines so that automatic action, such as rerouting data, can be taken when an alarm condition occurs. Price for the Online NCS is $6,500 for a license to manage up to 12 concentrators, or $12,500 for a license to manage 13 or more. **Chipcom, 118 Turnpike Rd., Southborough, MA 01772; 508-460-8900.**

Circle No. 306 On Inquiry Card

continued

CIRCLE NO. 166 ON INQUIRY CARD

THE PONY EXPRESS

In 1860, The Pony Express was able to get mail from St. Joseph, Missouri to California in only 8 days. An incredible achievement.

Today, with telephone tag, it can take you that long just to get a message to someone in your own organization. Incredible.

With Cymail -- the new e-mail system for UNIX, you can provide easy, effective communication for your entire organization, and put an end to telephone tag.

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We asked business people like you to tell us what they'd like to see in a user interface. They said they wanted Cymail to support character based terminals, and be easy to learn. We happily obliged. When they insisted on a full screen editor that is easy to use, we listened and built Cyed.

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When you need to send a spreadsheet to a co-worker, you probably have to put it on a diskette, and send it through office mail. With Cymail, you could have sent it electronically with just a few keystrokes.

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Cymail is an exceptional value at $145 for a single machine license (unlimited users) for SCO and Interactive UNIX.

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CIRCLE NO. 17 ON INQUIRY CARD

OUTPUT DEVICES

Looking for Prints

Two remarkably similar printers, one compatible with Sun's Newsprint and the other PostScript-compatible, have been released by competing manufacturers. SRS Imaging's Imager 1200 TL and Newgen's TurboPS/600T both offer 600 dots per inch (dpi) resolution, capability of printing on paper up to 11-by-17 inches, and a SCSI interface. The major difference is that the SRS Imaging printer is $11,995 and the Newgen printer is $14,995. There's also a Newgen 1200 dpi printer for $16,995.

SRS is bundling the SCSI cable and 57 PostScript-compatible fonts with its machine, which supports all UNIX print queueing mechanisms. Newgen bundles 35 PostScript-compatible fonts, but offers several other connection interfaces, including AppleTalk, RS-232, and Centronics. Emulations for the Newgen include HP LaserJet II and HPGL for plotters. It also incorporates a proprietary system called automatic recognition technology (ART) that selects the appropriate interface without the user having to do so at the printer. **SRS Imaging, 17252 Armstrong, Ste. B, Irvine, CA 92714; 714-852-6888. Newgen Systems, 17580 Newhope St., Fountain Valley, CA 92708; 714-641-8600.**

Circle No. 307 for SRS or No. 308 for Newgen On Inquiry Card

POTPOURRI

Computers and Communications Converge

HP's Applied Computerized Telephony (ACT) software lets you integrate a UNIX-based HP 9000 with your company's Northern Telecom PBX equipment for better routing of customer data with their telephone calls. Unifi Communications has gone a step further with its PhoneServer software for UNIX-based PCs. In the Unifi configuration, the PCs, incorporating integrated services digital network (ISDN) cards, take the place of proprietary hardware-based call processing systems. With this introduction, Unifi is offering both software development kits and applications.

The PhoneServer software consists of three pieces. The Controller directs the network on where and how to route calls, maintaining the status of network resources (employees and equipment). The Manager provides centralized monitoring, reporting, and configuration control. The Client Package takes care of the desktop services, combining them with the telephone system. A software development license, training, and a one-year warranty costs $50,000.

Unifi's own initial application is the Distributed Call Center (DCC). This is the software that lets the management information services director eliminate proprietary hardware-based call-switching systems. The DCC software is designed for use by telemarketing, customer support, or other service organizations within a company. It incorporates functions for call answering and routing, and specialized database and reporting capabilities. The DCC software

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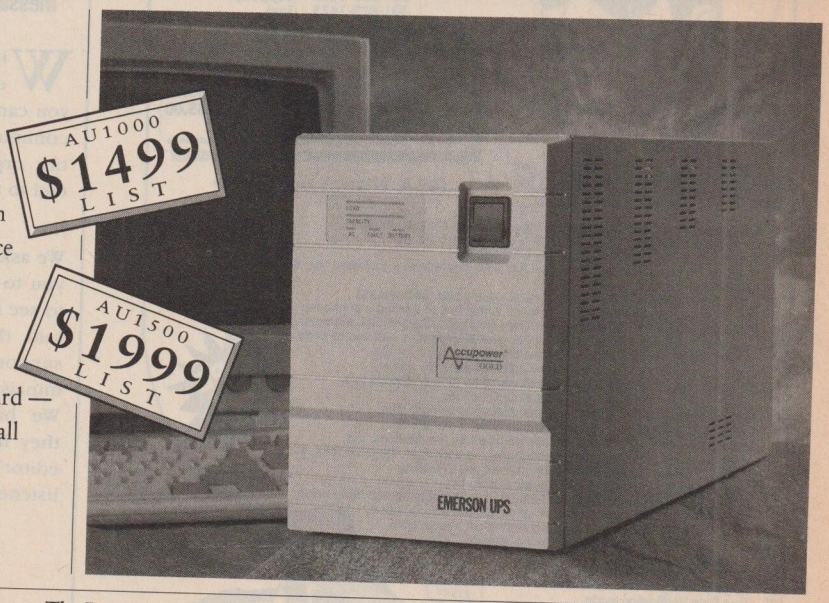

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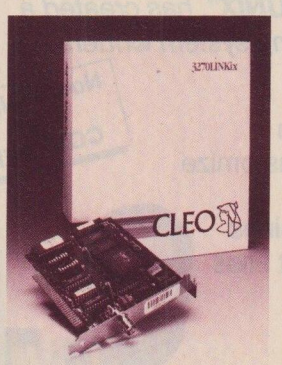
CIRCLE NO. 127 ON INQUIRY CARD

I • N • T • R • O • D • U • C • I • N • G

3270 Coax for UNIX



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You just plug in a coax board (our own or any IRMA3 or IBM advanced coax adapter or compatible), load the software, and

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link to your mainframe through a remote or channel-attached IBM 3174/3274 controller.

3270LINKix provides full emulation of IBM 3278 monochrome display terminals (models 2-5) and 3279 color terminals (models 2A, 2B, 3A, and 3B), in CUT or DFT mode.

You also get full IBM 3287 printer emulation (LU Types 1 and 3) for your UNIX-attached ASCII printers.

UNIX systems supported include SCO's UNIX System V/386, AT&T's UNIX System V/386, Interactive Systems' 386/ix, and others.

Features include:

- Application Program Interface (HLLAPI 3.0)
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- Up to five sessions, with support for remote or channel-attached SNA, in DFT
- User-configurable keyboard mapping
- Easy menu-driven configuration and interface

5 sessions, for remote or channel-attached SNA, in DFT

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is available in a $65,000 package that includes hardware, software, peripherals, ISDN cards, a voice/music response card, installation, training, and a one-year warranty. **Unifi Communications, 4 Federal St., Billerica, MA 01821; 508-663-7570.**

Circle No. 309 On Inquiry Card

Xtree, Xtree, Read All About It

The XTree file and disk management software familiar to DOS users now has a UNIX version that incorporates many of the software's traditional features as well as some specifically for UNIX, according to the company. The software allows "level logging" that lets you see only as much of the system as you need. You can also organize your system under XTree for UNIX into branches and nodes. A "go to" command lets you find files simply by typing the first few letters of the name.

You can also tag files or groups of files to either search for specified text, as with **grep**, or for backup purposes, as with **tar**. There's also a "compact" command to remove directory entries for deleted files. XTree for UNIX costs $295 for use with SCO and Interactive UNIX and XENIX. **XTree, 4330 Santa Fe Rd., San Luis Obispo, CA 93401; 805-541-0604.**

Circle No. 310 On Inquiry Card

SOFTWARE DEVELOPMENT

Xamining Xamine

Innovative Solutions' Xamine is an X Windows-based text editor for software developers that uses mouse commands and menus. It lets you scroll through text or move the cursor with the keyboard or the mouse. You can select files, write text or a portion of text to a new file, save while editing, spell check, and search using a regular expression. In addition, you can run the **sed** commands used in **vi**, including the : commands; and edit multiple files from a single invocation of Xamine. Cost is $95 each for one or two copies, $75 each for three to five copies, or $50 each for five or more copies. **Innovative Solutions, 3547 Colorado NE, Albuquerque, NM 87110; 505-883-4252.**

Circle No. 311 On Inquiry Card

I'm Primed for This

For those people who have applications written for Prime Computer's Primos operating system, Software Technologies Group has created its P/Convert tools and utilities to convert the applications to UNIX. P/Convert includes tools to automate the source-code changes, a compatibility library providing UNIX-based equivalents for the functions in Primos' application libraries, data file conversion tools, and utilities to recover data from Primos' "magsav" format tapes. Source code pricing for the entire suite of tools is $10,000, but components are available separately. Available initially on SPARC-compatible platforms, with other ports to follow. **Software Technologies Group, 1010 Lake St., Ste. 612, Oak Park, IL 60301; 708-386-2220.**

Circle No. 312 On Inquiry Card

STORAGE

Watchdog May Keep You Out of the Doghouse

Interchange Standards Corp. has developed a diagnostic tool called Watchdog that is designed to insure backup and reliability on quarter-inch tapes. It verifies that the tape drive is functioning properly and conforms to ANSI standards prior to the loading or unloading of the tape. It checks the drives on most UNIX workstations, testing the read circuitry, read/write heads, cartridge registration, filemark registration, and read-output signal quality. Price is $249. **Interchange Standards Crop., 2552 White Rd., Irvine, CA 92714; 714-863-9888.**

Circle No. 313 On Inquiry Card

ECCS Squeezes Exabyte

ECCS' Exa Module Turbo takes Exabyte's 8-millimeter tape drive and adds a plug-in SCSI upgrade card for data compression. According to ECCS, with the 2300 model, you can get backup capacities of 10 gigabytes, or with the 5200 model, 25 gigabytes. The data compression system utilizes a high-speed chip to implement the LZ-1 (Lempel-Ziv) compression algorithm in hardware, rather than in software as has been done in the past. Depending on the nature of the data, the company

UNIX Accounting For Under $100

UNIX software doesn't have to be expensive to be good. ***Ray Swartz****, author of* ***"ANSWERS TO UNIX"****, has created a full featured general ledger bookkeeping system written entirely with Bourne Shell Scripts.*

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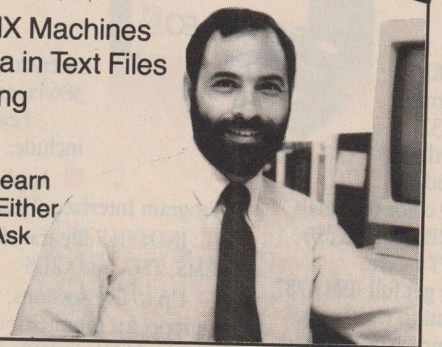

Use it to keep your books. Use it to learn shell programming from an expert. Either way, it's **only $79.95** plus shipping. Ask about our **limited time free offer.**

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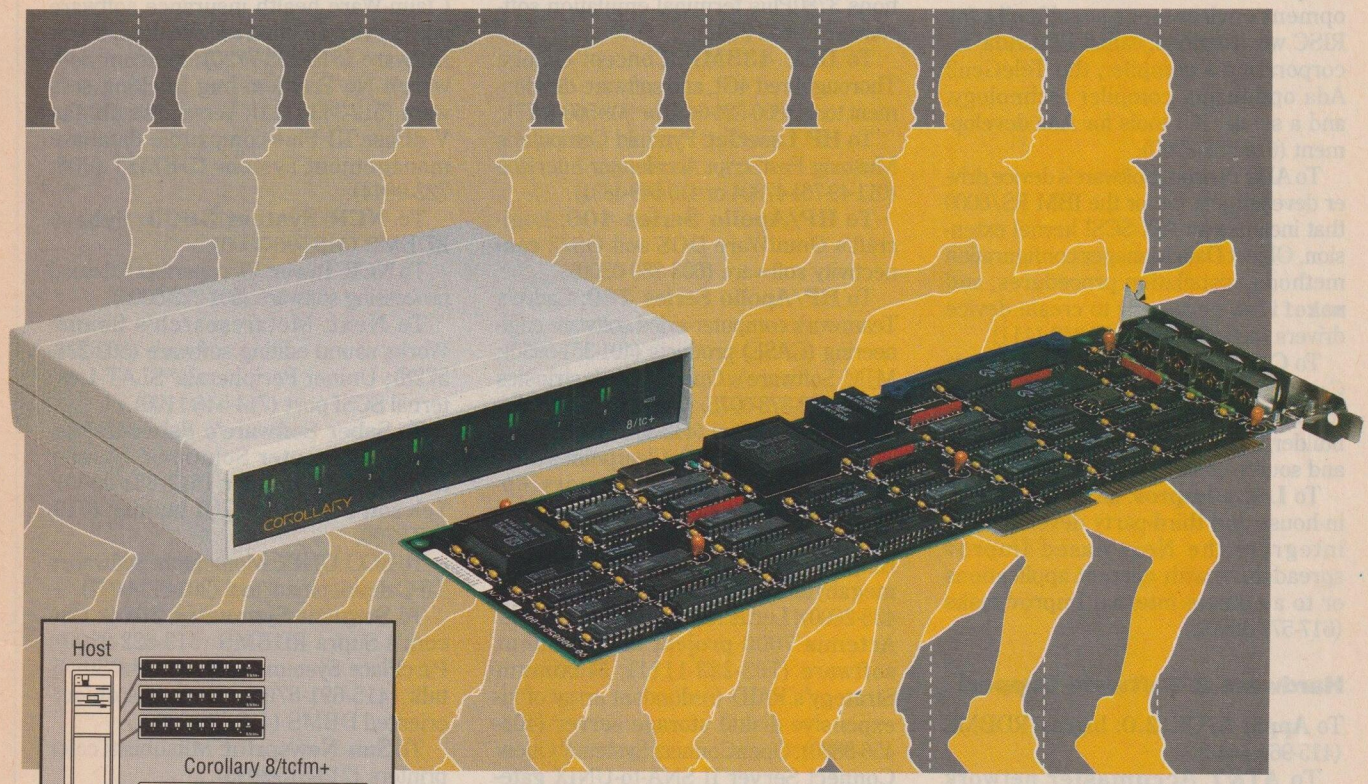
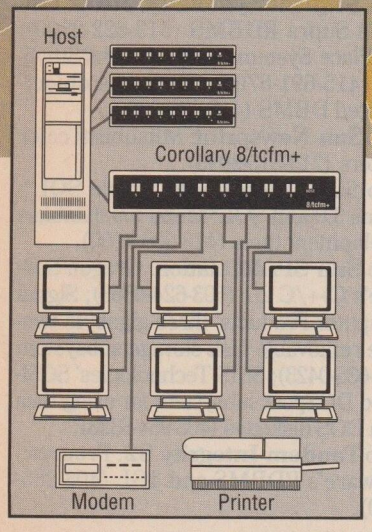
CIRCLE NO. 87 ON INQUIRY CARD

NEW 286 Power!

New Corollary 8x4GT 32-port I/O subsystem.

More power for the long run.





Use up to four 8-port terminal concentrators. 8x4GT with 286 processor.

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CIRCLE NO. 95 ON INQUIRY CARD

claims compression rates ranging from two to four times previous capacity.

The SCSI upgrade card is also available separately, and work with AT&T, Sun, NCR, and most SCO UNIX-based systems. Quantity one cost for the drive is $8,250, or $2,995 for the upgrade kit; quantity discounts available. **ECCS, 1 Sheila Dr., Bldg. 6A, Tinton Falls, NJ 07724; 800-322-7462 or 908-747-6995.**

Circle No. 314 On Inquiry Card

Compilers & Development Kits

To **Ada**: Meridian's Open ADA PC-based compiler (714-727-0700); Telesoft's development environment specifically for RISC workstations, called RISCAda, incorporating a compiler, the TeleGen2 Ada optimizing compiler technology, and a set of GUI tools for Ada development (619-457-2700).

To **AIX**: Pencom Software's device driver development kit for the IBM RS/6000 that includes an AIX SCSI kernel extension, Object Data Manager configuration methods, installation procedures, and `makefiles` necessary to create device drivers (800-736-2664, 512-343-1111).

To **C++**: Quest Systems' ObjectViews C++, incorporating such development tools as an object-oriented C++ GUI builder, a class browser, sample demos, and source code (408-496-1900).

To **Lotus Improv**: an API toolkit for in-house and third-party developers to integrate the Next-based Improv spreadsheet with current applications or to automate internal Improv tasks (617-577-8500).

Hardware & Software Support

To **Apple A/UX 2.0**: Ingres' RDBMS (415-969-4442).

To **AT&T Accumaster** network management system: Cabletron's Spectrum network management system, so that devices controlled by each system can be handled by the opposite system (603-332-9400).

To **AT&T LAN Manager for UNIX**: Data Connection's SNAP-IX source-code software for developing UNIX-to-IBM systems network architecture (SNA) applications (011-44-81-366-1177).

To **Compaq Systempro**: Kingston Technology's two- and eight-megabyte memory expansion boards (714-435-2600).

To **Data General Aviion**: Access Technology's 20/20 spreadsheet (508-655-9191); Momentum Software's XIPC interprocess communication (IPC) development tool (201-871-0077).

To **DECstation**: Alphatronix's Inspire optical storage systems (919-544-0001); Alsys' Ada compilation system and toolset (617-270-0030); Cognos' PowerHouse 4GL and Starbase RDBMS (617-229-6600); HP's OpenMail X.400 e-mail software (214-717-0068); Information Dimensions' BasisPlus document management system (800-328-2648 or 614-761-8083); Lawson Associates' Accounting System software (612-379-2633); Signal Computer Products' three-gigabyte, two-drive removable disk storage subsystem (508-635-0423); Standard Memories' four- and 16-megabyte memory boards (714-583-7500).

To **DEC Ultrix**: Cleo Communications 3780Plus terminal emulation software (313-662-2002).

To **DEC 433MP**: Concept Omega Thoroughbred 4GL and software development tools (800-524-0430 or 908-560-1377).

To **HP LaserJet**: Pyramid Computer's Mustang PostScript Accelerator Interface (011-49-761-47804 or 415-649-4831).

To **HP/Apollo Series 400**: Logicraft's OmniWare DOS and OS/2 connectivity software (603-880-0300).

To **HP/Apollo Series 700**: Cadre's Teamwork computer-aided software engineering (CASE) products (401-351-5950); MJM Software's Open Look Instrinsics (Xt+) (908-873-0075); Transarc's AFS distributed file system (412-338-4400).

To **IBM RS/6000**: Clearpoint's two-, four-, and 8-megabyte memory upgrades (508-435-2000); HP's OpenMail X.400 e-mail software (214-717-0068); Kingston Technology's 16-, 32-, and 64-megabyte memory upgrade kits (714-435-2600); Lucas Management Systems' Artemis 7000 project management software (703-222-1111); Maximum Strategy's RAID (redundant array of inexpensive disks) storage server (408-456-8880); OpenConnect Systems' OpenConnect Server II SNA-to-UNIX gateway software (214-490-4090); Phase II's Clockwise group scheduling software (617-937-0256); QStar Technologies' R650M rewritable optical storage subsystem (301-564-6006); Sigma Designs' Arris facilities management software (616-771-6745); Spectrum Concept's XCOM 6.2 file transfer software for proprietary IBM systems (800-365-9266 or 212-766-4400); Venue's Medley/6000 object-oriented programming software (415-508-9672).

To **Informix RDBMS**: Westmount Technology's ISEE/Informix toolkit integrating Yourdon-based analysis and design tools (818-597-9119).

To **Intel X86**: Ashton-Tate's dBase IV for UNIX (213-329-8000).

To **Interleaf**: integration with its Technical Publishing System (TPS) for Cadre Technologies Teamwork/DocGen document generation module (401-351-5950) and HP's SoftBench CASE tool (800-752-0900).

To **MIPS R3000**: Cyberscience's 4GL and Report Writer (800-451-1544 or 303-745-3900); Momentum Software's XIPC development tool (201-871-0077).

To **Motorola 88000**: Cobalt Blue's For_Struct Fortran structuring utility and For_C Fortran-to-C conversion software (408-723-0474); Dash Group's revenue accounting, ticket auditing, and flight operations modules for airline operations (215-670-1441); Logical Solutions' Claim-Ware health insurance software and Service Solution service department software (516-293-7730); Pencom Software's No Problem bug tracking software (512-343-1111); VersaSoft's dbMan V dBase III Plus-compatible database management system (DBMS) (408-723-9044).

To **NCR System 3600**: Sybase RDBMS (415-596-3500).

To **NCR Tower**: Wordperfect 5.0 word processing software (801-222-5006).

To **Next**: Metaresearch's SoundWorks sound editing software (503-238-5728); Uninet Peripherals' SLAT-1 external SCSI port (714-546-1100).

To **Saber Software's Saber-C**: Integrated Computer Solutions' Builder Xcessry GUI builder (617-621-0060); Telesoft's TeleUse GUI builder (619-457-2700.

To **SCO UNIX**: Momentum Software's XIPC development tool (201-871-0077).

To **Sequent Symmetry 2000**: Cincom's Supra RDBMS (513-622-2300); ParcPlace Systems' Objectworks\Smalltalk (415-691-6700); Versant's object-oriented DBMS (415-325-2300).

To **Sun Newsprint**: Mitsubishi color printers (213-515-3993).

To **Sun Open Look**: Oracle SQL*Forms 3.0 and SQL*Menu 5.0 database development tools (415-506-7000).

To **Sun SPARCstation**: Oregon Software's C++/C 2.1 (503-624-6883); Signal Computer Products' three-gigabyte two-drive removable disk storage subsystem (508-635-0423); SMS Technologies' SCSI-based DOSport subsystem for using data from DOS diskettes (408-954-8333).

To **Tandem Integrity S2**: Progress Software's RDBMS and 4GL (408-285-6000).

Hardware Upgrades

Cayman Systems modifies the GatorBox CS with two megabytes of memory,

different housing for cooler operation, a power supply compatible with global electrical power, and single-board construction (617-494-1999).

Cisco Systems adds a "dial-backup" capability to its routers, so that they can use secondary switched data-transmission media to substitute for a failed line or supplement an overloaded line (415-326-1941).

Datability has enhanced the network interface cards for its VCP-1000 communications hub, so that it supports up to 256 users and can accommodate network-wide downloading of software through ROM capabilities (212-807-8700).

Digiboard upgrades its DigiChannel C/X cluster controllers to include support for DB-25 connections, for multiple screens, and for access to multiprocessing systems (612-922-8055).

Equinox Systems added TCP/IP capability to its local-area transport terminal server (800-328-2729 or 305-255-3500).

MicroSpeed has redesigned its S-Trac trackball to incorporate three buttons (compatible with Sun and SGI mice) and an improved wrist rest (415-490-1403).

Sequent adds a 1.25 gigabyte SCSI disk drive, 96-megabyte and 192-megabyte memory boards, a 3480-compatible tape subsystem, and several backup and restore products to its Symmetry 2000 online transaction processing (OLTP) computers (503-578-9855).

Tektronix has added SNMP, LAT, and serial line internet protocol support to its TekXpress X terminals (800-225-5434).

Univision Technologies offers its X-11-TI X Windows server software for its AT-bus-based Piranha graphics processors (617-221-6700).

Xyplex has upgraded its bridge's internetworking software by adding support for parallel remote bridging (508-264-9900).

Software Upgrades

Applix now offers Asterix Mail for its X Windows-based Asterix integrated office software (508-870-0300).

Cadre Technologies offers the TestCase module for its TeamWork CASE tools, so that application developers can create reusable tests for error-checking code (401-351-2273).

Data Systems Support adds the ability for users to set up their own customized screens, as well as script-writing and browse capabilities to its version 3 of its SIRS (sales information response system) (714-771-0454).

Hummingbird Communications adds a local window manager to its DOS-based PC X Window server software (416-470-1203).

Interactive Development Environments has added reverse engineering and code-generation modules for synchronizing code and design, to its C Development Environment application development software (415-626-0651).

Island Graphics has color versions of its Island Write, Draw, and Paint software for Sun OpenWindows and OSF/Motif. It is also offering Draw and Paint software unbundled from IslandWrite for $695 (415-491-1000).

In version 2.2 of its XIPC development tool, **Momentum Software** has added the capability for asynchronous

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operations so that parallel requests can be initiated and executed, and for triggers so that IPC conditions can be monitored (201-871-0077).

Network Research has added a Windows 3.0 interface to its Fusion for DOS TCP/IP connectivity software, so that users can click on the appropriate icon to automatically connect to a UNIX server, rather than having to log-on every session (805-485-2700).

Silicon Graphics adds a new suite of diagnostic tools to its NetVisualyzer network monitoring software (415-960-1980).

Six Sigma CASE adds output and input filters for IBM's DB2 and Sybase relational databases to its Canonizer tool for automated database design (800-827-4462).

TeamOne Systems adds a process automation kit to its configuration management software so that developers can automate the flow of information between workgroups, project leaders, and management (408-730-3500).

Telesoft improves Open Software Foundation compatibility with its TeleUse 2.0 GUI builder, including the generation of both C and OSF's user interface language, as well as a Porting Kit for moving TeleUse applications onto Motif-based hardware platforms (619-457-2700).

TGV adds TCP/IP connectivity for DOS machines to DEC machines running Ultrix in MultiNet version 3.0 (408-427-4366).

Unify adds support for Motif, Open Look, and Windows 3.0 and adds new integration with Sybase's gateways to IBM's DB2 and customer information control systems software to Accell/SQL 1.3.3 application development tool (916-928-6400).

Verity upgrades Topic 3.0 document-retrieval software with wide-area networking capabilities and SQL database integration tools (415-960-7630).

White Pine Software enhances version 3 of its Exodus X Windows software for the Macintosh with support for interclient communications protocol and AppleTalk Data Stream Protocol (603-886-9050).

XVT Software now offers XVT-Design, an interactive design tool and application generator for its XVT GUI builder software (303-443-4223).

Z/Max Computing Solutions adds an online news management capability called XNews and a polling program called Xquery to version 3.0 of its XChange bulletin board software (315-635-1882). ■

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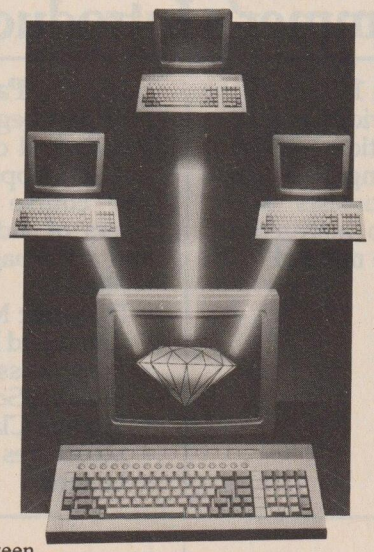

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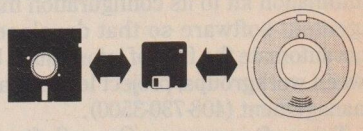

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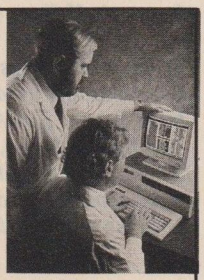

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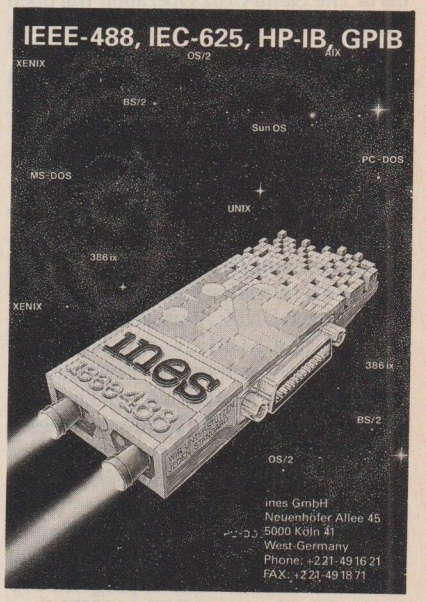

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UNIX Open Solutions: Sept. 4-6
Up to 7,000 information technology managers, resellers, network administrators, applications developers, and divisional managers are expected to attend the second annual UNIX Open Solutions Exposition and Conference. The conference program is structured to address open systems desktop computing solutions for the corporate user, and will demonstrate the capabilities of an open systems environment at the desktop and enterprise-wide levels.

Keynote addresses by Scott McNealy of Sun Microsystems and Douglas Michels of The Santa Cruz Operation will open the conference. McNealy will address "Open Standards: Power to the People." Michels, the executive vice president and co-founder of SCO, will speak on "UNIX on the Desktop: Now!" for his keynote.

Educational sessions are slated to assist corporate managers plan for evolving systems and show them how to incorporate updated applications into existing systems. Conference sessions are divided among seven tracks: Primers–A Basic Introduction to UNIX; Applications Development; Case Studies–Strategies of Implementation; Industry Perspectives; Management Issues; Networking and Communications; and Technical Issues.

Preceding the three-day conference will be 12 tutorial sessions, six presented by UNIX System Laboratories (USL) and six by the Open Software Foundation (OSF). According to Show Director Ronald Scott, this tutorial program represents the first time OSF and USL have been equally balanced in presentation at this type of event.

UNIX Open Solutions will be held at the San Jose Convention Center, San Jose, Calif. Contact the Interface Group, 617-449-6600.

EurOpen Autumn '91: Sept. 16-20
EurOpen, the European Forum for Open Systems, will be presenting the EurOpen Autumn '91 Conference and Exhibition in conjunction with EurOpen Hungary. The conference is the first to be organized by EurOpen in Eastern Europe and will give exhibitors the opportunity to approach the Eastern European market.

Technical tutorials held on the first two days of the event will cover subjects including: System V Release 4 internals, programming environments, Posix for programmers, new kernel facilities in BSD 4.3, UNIX security, and decomposition and generalization methodology for C++ programs. The following three days will consist of conference sessions on the themes of distributed processing, user applications, Open Systems Interconnection, system management and security, software development tools and languages, and performance measurement.

EurOpen Autumn '91 will be held at The Conference & Education Centre, Budapest, Hungary. Contact the EurOpen Secretariat, +44-763-73039.

Network & Distributed Systems Management '91: Sept. 18-20
Presented jointly by the Technology Transfer Institute and the Network Management Forum, The Network and Distributed Management Conference is billed as "the definitive user conference on integrated management of multivendor computer systems and networks." Targeting an audience of network managers, systems analysts, strategists, data communications managers, and network users in large multivendor environments.

The conference opens with all-day tutorials on network management strategies and planning, implementing open network management, and local-area network management. Conference sessions during the following two days will be highlighted with a special presentation from OSF on the Distributed Management Environment (DME). DME is expected to have significant impact on the creation of standard management applications and will potentially create a foundation for integrated multivendor platforms. Other topics covered include: business arguments for network management, hiring management system integrators, and distributed systems management.

The conference will be held at the Radisson Mark Plaza, Alexandria, Va. Contact Technology Transfer Institute, 213-394-8305.

Embedded Systems Conference: Sept. 24-27
The third annual Embedded Systems Conference, billed as the largest conference dedicated to real-time, will feature 75 educational sessions and 100 exhibitors during the four-day event. An expected audience of 2,000 programmers, software developers, and engineers will be able to attend sessions on topics including: UNIX networking and X windowing for embedded systems, Posix.4 and Posix.4A, reducing risks in RISC development, hardware-assisted debugging, manipulating hardware with C, evaluating and selecting high-end processors, and building high-performance software teams.

Exhibitors scheduled to participate include: HP, Intel, Motorola, Advanced Micro Devices, Wind River Systems, Lynx, Ready Systems, Microsoft, and SPARC International. The conference will be held at the Santa Clara Convention Center, Santa Clara, Calif. Contact Anastasia Kellow, 415-905-2322. ■

Please submit press releases and information regarding upcoming conferences and trade shows to Kim Austin at UNIXWORLD, *444 Castro Street, Mountain View, CA 94041. Due to editorial lead time, information must be received four months prior to the month of the actual event.*

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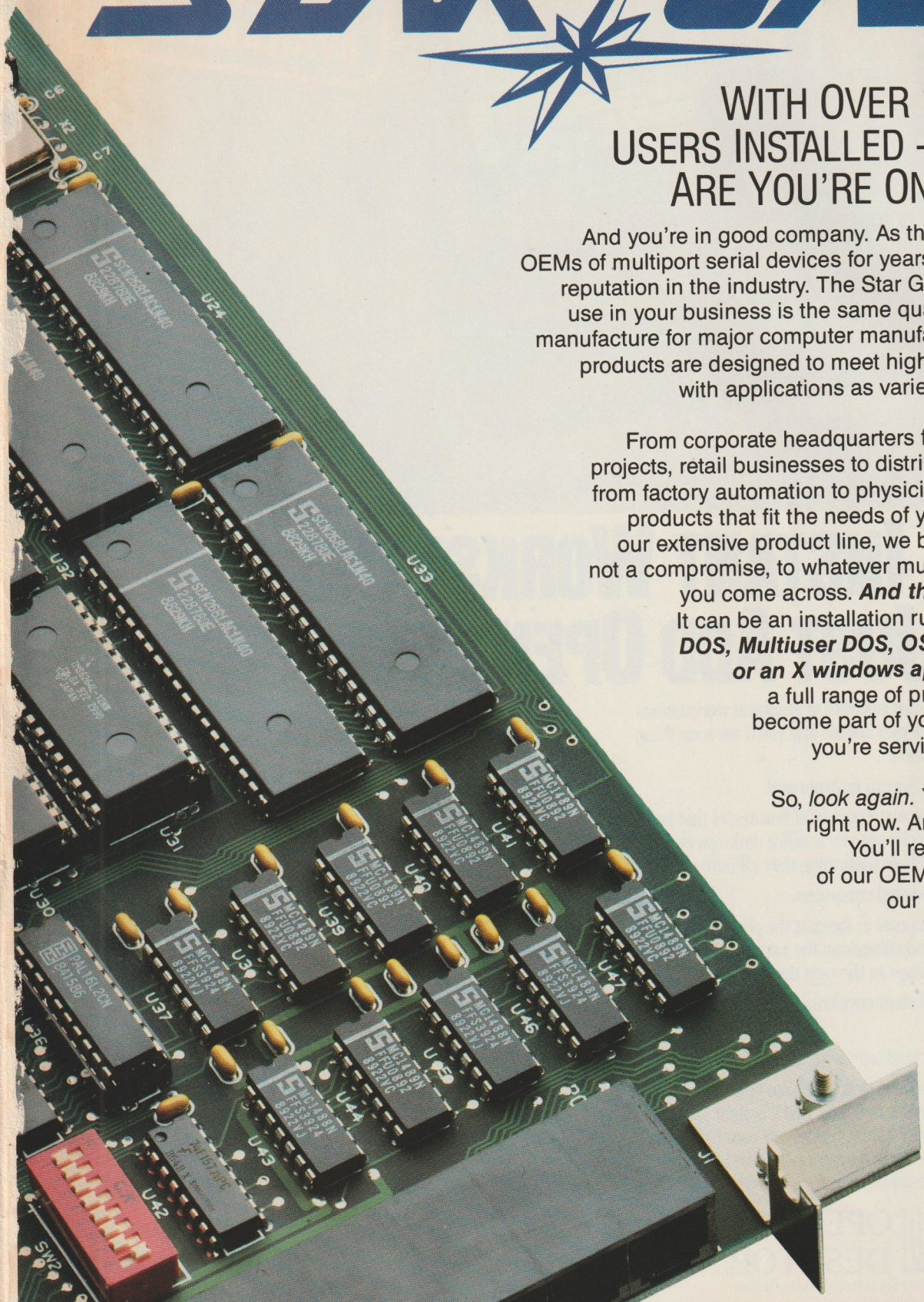

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